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The Jackson Lecture.¹

HOSPITALS—RETROSPECT AND PROSPECT.

By GLEN V. HICKEY,
Toowoomba.

ERNEST SANDFORD JACKSON was born on July 18, 1860, and died on June 29, 1938. His father owned Sandford Station near the little town of Sandford on the Glenelg River in the western district of Victoria, about half-way between Hamilton and Mount Gambier in South Australia. One may speculate as to whether his love of history originated in his early upbringing in a country that had associations with Mitchell, the Hentys and other early explorers.

Ernest Sandford Jackson was educated at Geelong Grammar School, and went to Trinity College at the University of Melbourne at the early age of fifteen years. He graduated in 1881 before he was twenty-one years old, acted as resident medical officer at the Melbourne Hospital, and in 1882 went to Brisbane, where he was appointed as medical superintendent of the Brisbane Hospital. He retained this position until 1898, when he started practice in Brisbane and was appointed surgeon at the hospital and

later consulting surgeon. He founded the training school for nurses at the Brisbane General Hospital—the first of its type in Queensland; the first qualifying examination was held in 1890. He was a foundation member of the Queensland Branch of the British Medical Association and was President in 1895, 1911 and 1920, and a member of Council until 1929.

Amongst his leading colleagues were A. C. F. Halford, A. J. Turner and O'Neill Mayne.

Jackson lived a long and useful life and must have seen many changes take place in medical concepts and practice, some of them revolutionary. The introduction of things that are commonplace or even outmoded to a present-day generation must have had a staggering impact on the minds of many practitioners in his day. Radiology alone must have opened vistas of a strange new world—the advent of the machine into medicine—not altogether an unmixed blessing. The introduction of diphtheria antitoxin was another event that must have been of supreme importance. Pioneers of western Queensland have told me harrowing stories of the havoc caused by diphtheria in the days before antitoxin, and of the dread of this deadly disease and the helplessness of doctors in trying to treat it. Fortunately our profession has always had members in its ranks who have had the ability to discern and choose the right path to take in dealing with changes, either minor or major, in matters relating to the health of their patients.

Although Jackson was of a generation which perhaps knew not the word specialist and in which most doctors

¹ Delivered at a meeting of the Queensland Branch of the British Medical Association on October 2, 1953.

were necessarily "Jacks of all trades", there is no doubt that he had two great interests—hospitals and history. His long experience as a medical superintendent had given him insight into many of the problems associated with hospitals, and they are legion.

In May, 1930, a Royal Commission of three was appointed to report on various aspects of Queensland hospitals. Jackson was the only medical member, the others being a police magistrate and an auditor. In November, 1930, a report of about 80 pages was issued, and various recommendations were made. It is almost needless to say that it is doubtful whether effect was given to any of these, and one wonders whether anyone ever studied the report, which must surely have entailed much hard work, both physical and mental.

However, it is of little use to wonder about the sins of the past; but it may be profitable to spend some time considering our present-day hospital system, its merits and demerits, and what Jackson would have thought of it and advised.

Firstly, the hospital problem has many facets, and most of these are constantly changing.

A. Finance.—We have seen a changing pattern over the years, always tending to government provision of money with a natural expansion of government control in other directions.

The costs of building, equipping, maintaining and staffing hospitals have risen enormously; it is unnecessary to go into detail. Can anything be done to spread the burden? The answer is in the affirmative. Capital cost, in my opinion, can be met in many instances only by subsidy from the central government.

The means test, of course, has become a political battle-cry and a rallying point or target, according to which side one is on. Logically there is little or nothing to be said for its abolition. Why should hospital treatment be free to all, irrespective of their financial status? Why not free trains and free foodstuffs—which incidentally may be a much bigger factor in health than hospitals?

From the viewpoint of practical economics it may well be asked how long we can afford the luxury of paying the costs of hospital services (costs which are constantly increasing) to people who can well afford to pay either out of their own pocket or through the medium of some form of insurance.

The spread of hospital insurance schemes for the general population will undoubtedly provide a growing source of revenue for running costs and bring back the era of prosperous and efficient private hospitals. In this connexion I would venture to say that the organized profession should take some positive steps to ensure as far as possible a high standard of service from such institutions.

I am aware that we have government licensing and supervision, but I think it highly desirable that some recognition should be accorded by the medical profession to those hospitals which build themselves up to a sufficiently high standard. I am not clear whether such machinery exists, but it can be provided.

B. Planning.—The word "planning" has been ridden to death of recent years and is redolent of dictatorship and brain trusts whom many are prepared to trust and others to brain. However, if the planners and their machinery are sufficiently flexible in outlook and in deed, there is no reason why they cannot produce good results.

The control must be central—preferably in the hands of a department of health or a hospital commission or authority—call it what you will. Competent people should be invited to assist on a geographical basis. They should represent a wide cross-section of the community, and specifically should include an architect with local knowledge and representatives of various public or semi-public bodies—for example, trade unions, chambers of commerce *et cetera*. Such machinery already exists in the United States, where an Act of Congress (*Hill-Burton Act*) allows the Federal Government to subsidize up to one-third approximately the construction of hospitals in areas where it would be impossible to raise all the money locally.

In the State of Washington, where there are many scattered and semi-isolated communities comparable with parts of Australia, many such hospitals have been built—this without interfering in any way with local autonomy. It seems that, given the right people and the right outlook, centralization and decentralization can work hand in hand. It is almost needless to mention that medical opinion as expressed by State medical associations *et cetera* is welcomed and given.

In how many instances does this apply here?

Planning includes design not only for the present, but for the future, allowing for expansion without detracting from appearance or efficiency.

The question of immediate design is bound up with a further problem—that is, the function of a hospital, and of course I mean a general hospital. This is a very wide subject and almost deserves a paper to itself. The primary function must surely be regarded as the treatment and prevention of disease and suffering in the community. Secondary functions are teaching and training of personnel—medical (both undergraduate and graduate), nursing, administrative, and so on. A further and perhaps more contentious function is its use as a diagnostic centre. Some folks say, and perhaps with good reason, that diagnosis must be looked on as part and parcel of prevention and is inseparable from hospitals. Against this it may be argued that hospitals can tend to become diagnostic centres, turning out nicely labelled products for treatment by outside practitioners. These doctors then become purveyors of the products of chemical industry—they do not have to think for themselves.

In fact, such tendencies have already been observed. It is a deplorable fact that some members of our profession are sending private patients to out-patient, radiological and pathological departments in public hospitals when adequate private facilities exist. In so doing they are adding to the burden of the hospitals and are doing a grave disservice to private practice and eventually to themselves. I cannot see any excuse for the continuance of such a state of affairs when the remedy lies in our own hands. It would be a deplorable thing if the hospital were to take over the role of the general practitioner.

The remedy lies partly in our own hands—improvement of service. The days of treating patients on an assembly-line basis should disappear with the abolition of contract practice and its attendant weaknesses.

A further remedy leads us on to the general question of staffing of hospitals. For this purpose we have in the past tended to separate our hospitals into three groups: (a) teaching hospitals, (b) base hospitals, (c) smaller institutions, mainly in country centres.

It has been accepted as almost axiomatic that teaching hospitals should be staffed only by specialists, and this is being applied to the base hospitals also. The corollary, of course, is that there must be no place for the general practitioner in either class of hospital. At the same time the general practitioner is responsible for staffing the smaller hospitals almost entirely.

I venture to say that this position is wrong both in theory and in practice. Medicine is a whole made up of component parts, which may be diversified but are still part and parcel of one. Surely it is illogical and impractical to think that any hospital can obtain maximum efficiency if its staff is to be restricted in outlook and ability. That being so, surely there must be a place for the general practitioner's influence and precepts in even the largest hospitals. With even more force can it be said that there is need for specialist provision on a geographical basis.

Conditions of modern travel are improving at such a rate that most places should be within the range of people with the necessary skill and knowledge to deal with any class of case. The Flying Doctor Service is an outstanding example of the application of this idea with success.

Can anyone have reasonable doubt that teaching of students and resident medical officers would not be improved by the inclusion of general practitioners on the teaching staffs? Such an idea is gaining acceptance in

some parts of the world, and, indeed, here in Queensland. I believe that it will gain many more adherents in the not far distant future. Such people would need to be chosen with great care, and their credentials—knowledge, ability and personality—would have to be of the highest order.

Are there such people in the general practitioners' ranks? I believe that there are, and I further believe that the knowledge that such positions existed would tend to produce more general practitioners of the necessary standard. Nobody in his right senses would advocate the throwing open of all hospitals to all doctors; but the ways and means of effecting at least some broadening of our position are surely not beyond our ability to conceive and execute.

Administration.

Should all control be centralized? Or should there be some measure of local autonomy through a committee, board or similar body?

Should hospitals be run by managers appointed by a departmental head, and members of the public service?

One would say that local autonomy is always preferable, but that suitable people should be chosen. At present suitability appears to be purely a matter of political belief or rather adherence. If board members were appointed to represent the community as a whole rather than a portion of it, there would be an immediate gain in public confidence. Furthermore, there should surely be medical representation on the management of all hospitals with 100 beds or more—perhaps that figure is too large. In the report of the 1930 Royal Commission this was recommended by two of the commissioners, the chairman, who was a government servant, dissenting.

Cooperative hospitals exist in some centres and are doing splendid work, at least in the view of local people.

The following recommendations are made mainly as a basis for thought and action: (i) regional autonomy; (ii) central government subsidy toward capital costs; (iii) imposition of some income limitation on occupants of public beds except in grave emergencies; (iv) medical representation on governing bodies of larger hospitals; (v) steps by the profession to improve the standard of hospitals and recognize efficiency in some tangible fashion. Why wait for the government to do everything? (vi) Provision for general practitioners on staffs of all general hospitals.

You may notice that I have omitted planning—not because I think it unnecessary, but that I feel it is a little vague and abstract and the other things are concrete things.

Finally, I thank you for a patient hearing. I have tried to keep my feet on the ground and be practical. I am well aware that much of what I have said has been said or written by better-informed people. Sir A. Daly's articles in the *British Medical Journal* should be read with care by all doctors.

If you go away disagreeing with much or all of what I have said, I shall not be surprised. If you go away agreeing with me, I shall be surprised. If you go away stimulated to study these problems for yourselves and take an active part in matters affecting the professional welfare, then I shall be flattered and rewarded.

THE NUTRITIVE VALUE OF YEAST EXTRACT.

By K. T. H. FARRER,
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YEAST has long been recognized as a potential source of large quantities of protein and other nutrients, and much has been done from time to time to introduce it into the human dietary. During the first World War yeast was used extensively for food in Germany, and again in the second World War it became a major source of protein in the same country. Subsequently great efforts have been

made to introduce yeast into the diets of colonial peoples, and the Jamaica experiment of Colonial Food Yeast, Limited (1944), has been followed with interest.

Yeast is rich in first-class protein, phosphate and the vitamin B complex, and there is experimental evidence to emphasize its dietary value (see, for example, the work of Sure, 1930, 1946a and 1946b, 1950; and Seeley *et alii*, 1949), which derives from the high protein content (45% to 50% of the dry substance), from the quality of the protein, which is rich in cereals, and from the high potency of B complex vitamins, some not yet fully understood.

The Limitations of Yeast.

Some foodstuffs which, from their analysis, look attractive nutritionally, prove to be incompletely absorbed, so that much of their nutritive value is wasted. It seems clear that this is so with whole yeast cells.

Parsons and her co-workers have studied intensively the availability for human subjects of vitamins from yeast. They have found that the aneurin (Parsons *et alii*, 1945a) and riboflavin (Price *et alii*, 1947) of the yeast are not available for absorption if the yeast is fresh, or if it is dried but still viable (Ness *et alii*, 1950). If it is dried and killed, or killed by boiling (Parsons *et alii*, 1945b), the vitamins are given up; but it is not advisable to rely on this, as the killing may not be complete. Freezing for periods up to twenty-four hours did not increase the availability of aneurin.

Hochberg *et alii* (1945), using physiological availability tests, have put the vitamin B₁ availability from yeasts as low as 17%.

The most serious disadvantage is the discovery that viable yeasts can take up and remove from the alimentary tract aneurin already there (Kingsley and Parsons, 1947; Garber *et alii*, 1949). This is characteristic, as the avid collection into the yeast cell structure of aneurin in the medium is well known and, indeed, is the reason for the high vitamin B₁ content of brewers' yeast. Riboflavin, on the other hand, is not taken up (Garber *et alii*, 1949). It has further been shown by the same authors that humans are able to use much of the nitrogen of active yeast. This is an interesting observation, and the explanation for the selective absorption of some of the nutrients of yeast is still awaited.

This serious criticism of yeast has resulted in the United States Food and Drug Administration taking off the market bakers' yeast intended for human food (Sure, 1950). In this country, where food and, more especially, protein shortages are not a problem, the use of yeast as a normal article of diet is not likely to occur. On the other hand, yeast extract is fully available and is used extensively in the diets of infants and children as well as by adults.

The Manufacture of Yeast Extract.

Yeast extract has gradually come into prominence over the last fifty years. It may be prepared from brewers' and bakers' yeasts, both of which are strains of *Saccharomyces cerevisiae*, and from food yeast, *Torulopsis utilis*, in any one of three ways—by hydrolysis, by plasmolysis and by autolysis.

Hydrolysis will involve heat treatment with acid or alkali. In either case good extraction of the cell contents is obtained; but the higher temperatures involved and, particularly, alkaline conditions will greatly decrease the recovery of vitamins. Furthermore, the final product is not yeast extract, but protein hydrolysate.

Plasmolysis may be effected by high concentrations of salt (Diller, 1942), by ethyl acetate (Weizmann, 1938b), or by fruit juices (Weizmann, 1940). Scarcely any work has been published on such products; but, in the present writer's experience, considerable amounts of nutrient remain behind in the yeast cells. The temperatures used are 35° to 36° C.

Autolysis, too, is a mild process. When brewers' yeast is used, it is first sieved to remove hop resins, and debittered. Windisch *et alii* (1928) used 10% sodium carbonate solution for debittering. Maizel (1948) speaks of raising the pH to 6.5 or 7.0 with sodium carbonate. Diller (1942)

reports that 3% sodium carbonate solution, ammonium carbonate solution or sodium hydroxide solution is used. In any case, washing follows. Diller (1942) states that part of the alkali-sensitive vitamin B_1 is lost. Work in the author's laboratory has shown that this is not so when debittering is carried out at ambient temperature. This is no doubt due to the great resistance of living yeast to any change in pH within the cell itself (Drews, 1936; Gottschalk, 1943).

Autolysis takes place when the yeast is suspended in water and the temperature is raised above 37° C. Various temperatures have been suggested: 37° (Dernby, 1917), 45° (Drews, 1936), 48° to 49° (Konovalov, 1938), 50° (McClary, 1948), and 50° to 55° (Windisch *et alii*, 1928); but the end products appear to be the same throughout.

The proteolytic enzymes of the yeast take over and degrade the yeast protein into soluble fractions which diffuse through the cell wall, and, together with the vitamins and most of the minerals, are found in the surrounding aqueous phase. The yeast cells are not ruptured during autolysis and are separated centrifugally. The resulting clear, light brown liquid is then concentrated *in vacuo* to a thick paste, which is a fourfold or fivefold concentrate of the original yeast. The use of a vacuum is essential if the best flavours are to be obtained and the vitamin B_1 of the original yeast is to be retained.

The Chemical Composition of Yeast Extract.

The analytical data tabulated (Tables I and II) refer to a product sold under a trade name; this is a yeast extract prepared by autolysis, which contains some added salt and very small amounts of certain vegetable flavourings used solely to improve its palatability. As complete separation of the autolysate is not mechanically possible, some empty yeast cells occur.

TABLE I.
Chemical Analysis of Commercial Yeast Extract.

Substance.	Proportion or Amount.
Moisture	33.0%
Nitrogen	5.75%
Nitrogen $\times 6.25$	36.0%
Total ash	16.0%
Sodium chloride	10.5%
Phosphorus pentoxide	1.85%
Potassium monoxide	3.30%
Magnesium oxide	0.31%
Total carbohydrate	5.0%
Reducing sugars	1.0%
Bar	NH
Aneurin (thiamine)	60 to 90
Riboflavin	60 to 80
Nicotinic acid	450 to 550
Pantothenic acid	60 to 70
Folic acid (free)	3 to 4
Folic acid (total)	18 to 20
Microgrammes per gramme.	

Sometimes vegetable extracts are mixed with yeast extracts to form a composite product. The nutritional advantages of the former are not clear. Vegetables are very low in the vitamin B complex as compared with yeast, although the three major components can easily be provided nowadays by fortification. Vegetable protein is notoriously deficient in certain essential amino acids, and vegetable extracts are high in sugars and frequently contain starch as well. The former will, furthermore, interfere with the availability of the lysine provided by the yeast. True yeast extracts can be quickly differentiated from such mixtures by testing for starch with iodine. Starch is not found in yeast.

Yeast Extract as a Source of Vitamins.

Yeast is the richest natural source of the vitamin B complex. It has been shown (Farrer, 1946 and 1951) that, on autolysis, all the vitamin B_1 , riboflavin and niacin, and by far the greater part of the pantothenic acid of yeast pass rapidly into the autolysate. It has further been shown (Farrer, unpublished work) that, especially if due care is taken with temperature, all these vitamins can be retained

in the concentrated extract. Yeast extract is thus a very rich dietary source indeed of the B complex vitamins, as can be seen from Table I, and, moreover, there is no question of the non-absorption of these factors as in the case of yeast cells.

In 1944 the staff of the Australian Institute of Anatomy, Canberra, conducted a survey of the food consumption in Australian households. It was found that 46.2% failed to obtain the dietary allowances of vitamin B_1 , recommended by the National Research Council of America. The mean daily intake *per capita* was 1078 microgrammes, compared with the weighted average recommended intake of 1037 microgrammes. However, the figures have been calculated on the edible portion of the various foodstuffs, apparently without allowance being made for cooking losses, which are high. Thus it is likely that the figure obtained even for the *per capita* intake errs on the high side, but in any case it is apparent that there is a real tendency for the content of vitamin B_1 to be low in Australian diets. This vitamin was the only one of the B complex studied, but it is known that if one member is available in only marginal amounts

TABLE II.
The Distribution of Nitrogen in Commercial Yeast Extract.

Type of Nitrogen.	Percentage of the Total.
Insoluble nitrogen	5.0
Proteose nitrogen	10.0
Peptone nitrogen	37.0
Subpeptone nitrogen	23.0
Amino acid nitrogen	25.0

in the edible portion of the food purchased, the contents of the others will also tend to be low (Vedder, 1943).

The possibility of subclinical deficiencies of vitamin B_1 has been recognized for some time (Jolliffe *et alii*, 1939; Williams *et alii* 1940; Williams and Mason, 1941; Johnson *et alii*, 1942; Spies *et alii*, 1943), and low levels of B vitamins are believed to reduce quite seriously the biological value or utilization of protein (Sure *et alii*, 1941; McHenry and Gavin, 1941; Kleiber and Jukes, 1942). While no ordinary article of diet can match the therapeutic effect of massive doses of mixtures of the B complex, there is every incentive to avoid the necessity for submitting to a medical discipline by including a rich source of the complex in the normal diet. This is especially so with children. From the minimum figures quoted in Table I it is apparent that six grammes of yeast extract (one level teaspoon) ingested in various ways during the day will account for about 35% of the weighted average recommended intake of vitamin B_1 . This, added to the supplies obtained from all other foodstuffs, will ensure that the daily requirement is exceeded.

It is now generally recognized that deficiency diseases are not limited to lack of a single factor. Williams and co-workers (1939 and 1940) present evidence of the multiple nature of the deficiency in beriberi, and Vedder (1943) has shown that polished rice, the staple food associated with beriberi, is deficient in the fat-soluble vitamins, certain minerals, and riboflavin, niacin, thiamine, pantothenic acid, pyridoxin and choline. Similarly, Goldsmith (1950) states that "patients who have riboflavin deficiency often have signs of niacin and thiamine deficiency as well", and suggests the use in such cases of some source of the entire complex. Brenner and her co-workers (1949) prefer natural sources of fortification of the B complex for army rations, because nutrients not yet understood would also be supplied.

Soskin and Levine (1950) have summarized the role of the various B complex vitamins in the breakdown of carbohydrate. While definite knowledge is available about only three of them, they expect that other members of the complex will eventually be found to play a similar part, and point out the fallacy of regarding any single factor as more important than another. Their conclusion is as follows:

For this reason, and until we have isolated and know the precise function and optimal proportion of each component part of the *B* complex, a source containing all the factors remains the best protective dietary supplement with which to avoid the evils of modern food refinement.

Yeast extract is the richest dietary source of the complex available.

A further argument in favour of obtaining the *B* complex as a unit from normal dietary sources is the known possibility of producing a deficiency of one component by administering large doses of another. As early as 1939 Sydenstricker *et alii* issued a warning that the prolonged administration of large doses of a single vitamin could lead to deficiencies of other members of the complex. Malaguzzi-Valeri (1943) has described nervous disorders which he ascribes to vitamin antagonism brought about by the administration of folic acid in pernicious anaemia. Magyar and Gabor (1949) found intestinal absorption of aneurin in the rat to be impaired by the administration of other *B* vitamins, and Malaguzzi-Valeri (1951) has described a riboflavin deficiency in human subjects brought about by the daily administration of large doses of vitamin *B*₁. This argument is given weight by the conclusion of Bhagvat and Devi (1949), based on rat studies, that there is a close interrelationship between the different *B* vitamins.

It is well known that vitamin *B*₁ is heat labile and gradually disappears on storage even at room temperature. Farrer, in a series of papers summarized in 1947 and subsequently extended (1948, 1949a and 1949b), has described factors influencing the thermal destruction of vitamin *B*₁. Losses on storage have also been discussed quantitatively (Farrer, 1950 and 1953), and it is the manufacturer's responsibility, when claims are made for vitamin *B*₁ potency, to see that due allowance is made for this property.

Riboflavin, too, is subject to thermal losses, but at the normal pH of most foods these are low (Loy *et alii*, 1951). Niacin is heat-stable.

Pyridoxine is very stable to heat (Hochberg *et alii*, 1944; Cunningham and Snell, 1945), and folic acid is stable above pH 5.0 (Dick *et alii*, 1948). Pantothenic acid also resists thermal destruction, maximum stability being at pH 5.0 to 7.0 (Frost, 1943).

Yeast Extract as a Source of Amino Acids.

First-class proteins are generally considered to be those of animal origin, plant proteins being somewhat deficient in one or other of the essential amino acids. Yeast protein is very similar in amino acid make-up to animal protein, as may be judged from Table III (amended from Block and Bolling, 1945). Sixteen grammes of yeast nitrogen from the sources shown would provide the quantities of essential amino acids listed.

TABLE III.¹
Essential Amino Acid Contents of Various Proteins (Percentage).

Amino Acid.	Yeast.	Meat.	Casein.	White Flour.
Arginine ..	4.3	7.7	4.1	3.0
Histidine ..	2.8	2.9	2.5	2.2
Lysine ..	7.5	7.2	7.5	1.9
Tyrosine ..	3.6	3.4	6.4	3.8
Tryptophane ..	1.3	1.3	1.2	1.2
Phenylalanine ..	4.1	4.9	5.2	5.5
Cystine ..	1.0	1.3	0.4	1.9
Methionine ..	2.7	3.3	3.5	3.0
Threonine ..	6.5	5.4	3.9	2.7
Leucine ..	7.4	7.7	12.1	5.8 ²
Isoleucine ..	5.9	5.2	6.5	3.3 ²
Valine ..	5.0	5.7	7.0	3.6 ²

¹ After Block and Bolling (1945).

² Whole wheat.

These figures show yeast protein to be directly comparable with the two most important proteins in human nutrition, meat and casein. They also show wheat protein to be seriously deficient in lysine.

Sure (1952) has discussed the heat damage of cereal protein and shows that for rats this damage can be more

than overcome by the incorporation in the diet of 0.4% of l-lysine. The protein efficiency ratio (P.E.R.) of the original whole wheat can be almost doubled by the addition of 0.4% of l-lysine, 0.5% of dl-valine and 0.2% of dl-threonine. While Sure's maximum results were obtained by the further addition of fish-soluble extract and vitamin *B*₁₂, it is evident that the amino acids *per se* were greatly increasing the efficiency of the cereal protein. It must also be remembered that the cereal protein studied was in a processed whole-wheat breakfast food, and hence that quantities of amino acid required to improve the relatively undamaged protein of bread will be a good deal less than those used by Sure.

There seems little doubt that yeast extracts prepared by autolysis contain the same amino acids as yeast protein, and in the same proportions. Meisenheimer (1919, 1921) used the Fischer ester method to show the presence of glycine, alanine, valine, leucine, proline, phenylalanine, aspartic acid and glutamic acid, tyrosine, tryptophane, arginine, histidine and lysine. Microbiological assays have been similarly used in the present writer's laboratory.

Work in progress in the writer's laboratory has shown so far that at least four of the essential amino acids, including lysine, are liberated from autolysing brewers' yeast at the same rate. It seems reasonable to assume that the others will also appear together, and that the amino acids of yeast extract will prove to be those of the original yeast present in the same proportions.

At first sight it may seem that yeast extract is used in quantities too small to be significant in the diet. However, it would appear on a closer examination that it can play a part out of all proportion to the actual quantities used.

Firstly, in its commercial form it is almost half protein derivatives, so that a quarter of an ounce will contribute three grammes towards the daily requirement of, for example, the 60 to 70 grammes for adults and for children in the seven to twelve years age group. Secondly, these protein derivatives are almost all in the form of peptones or amino acids (see Table II), and are therefore completely assimilable. Thirdly, its particular value as a source of amino acids lies in its ability to "up-grade" the protein of cereals, especially bread, through its lysine content.

Vegetable proteins are notoriously poor in lysine. This is of particular importance in connexion with cereals. It has been stated that "the addition of small amounts of lysine to whole wheat or to white flour will more than double their nutritive value, converting them from inferior protein foods to foods having a nutritive value almost as good as many of the more expensive animal protein foods" (Block, 1945).

Duckworth (1952) has summarized our present knowledge of the behaviour of lysine in cereals. He quotes experiments which show that the superiority of oat bread over wheat bread is attributable to the greater lysine content of the former, and discusses the damage done to the nutritive value of cereals by heat treatment. Lysine is particularly vulnerable, especially in the presence of reducing sugars. It is likely that its free amino group forms linkages which are not easily hydrolysed by enzymes. It has been shown (Cremer *et alii*, 1951; Rosenberg and Rohdenberg, 1951) that much of the lysine added to bread to correct its specific deficiency is lost in baking, and that, to be effective, the amino acid must be added after baking (Cremer *et alii*, 1951).

The particular value of yeast extract is now apparent. Macy, as quoted by Block and Bolling (1944), has worked out a daily requirement of essential amino acids as set out in Table IV.

An ideal first-class protein would contain these essential amino acids in the ratios of the recommended daily consumption, as there is a sound basis for the belief that protein synthesis in the body, and the retention of nitrogen for growth, require the simultaneous presence of all the essential amino acids (Geiger and Geiger, 1948).

The protein available in bread (mainly gluten) approaches this ideal in most cases, the major deficiency

being lysine. A sandwich composed of two one-ounce slices of bread may be considered: 8% protein contains 0.72 grammes of nitrogen and only 0.086 grammes of lysine. If gluten was an ideal protein, two ounces of bread would contribute 0.207 grammes of lysine. There is thus a deficiency of 0.121 grammes of lysine. If each slice was spread with butter and two grammes of yeast extract, the extra lysine provided would be 0.08 grammes. The commercial yeast product previously mentioned has been shown by actual assay to contain 20 milligrammes of lysine per gramme. That is, the combined lysine from the bread and yeast extract is double that obtainable from the bread alone as contributed by, say, bread and jam or bread and butter. This is of some importance, especially from the point of view of lunches for school children, for the quantities, though small, refer only to part of one meal, and are sufficient, if yeast extract is accepted as a normal article of diet, to raise marginal diets above the safety limit.

TABLE IV.

Amino Acid.	Recommended Daily Consumption. (Grammes.)	Amino Acids in Bread Protein. (Grammes per 16 Grammes of Nitrogen.)
Arginine ..	4.7	3.9
Histidine ..	1.0	2.2
Lysine ..	4.6	1.9
Tyrosine ..	3.9	3.8
Phenylalanine ..	0.9	1.8
Cystine plus methionine ..	3.7	5.5
Threonine ..	3.2	4.9
Leucine ..	9.6	5.8
Isoleucine ..	3.1	3.3
Valine ..	3.2	3.6

Further emphasis is lent to this argument in the observation of Block (1944) that, while cereals provide 27% of the protein of the American diet, they provide only 10% of the lysine.

This discussion is concerned only with pure yeast extract. Admixtures with other extracts prepared from lysine-poor sources and containing carbohydrate must, *ipso facto*, reduce by dilution the effective lysine content and expose the lysine present to inactivation through risk of the Maillard reaction in the product itself. Thus, for example, a mixed yeast and vegetable extract has been found by assay to contain only 11 milligrammes of lysine per gramme—that is, about half the amount found in pure yeast extract.

Yeast Extract in Special Diets.

Patients who are required to follow rigid diets frequently value the variation which a highly flavoured product such as yeast extract can bring to otherwise monotonous dishes.

This is particularly so with those restricted to a salt-free diet, and questions on the salt content of proprietary yeast extracts are frequently being asked. Obviously, the salt content of commercial yeast extracts may vary according to the product. That referred to in Table I contains 10% to 11% of sodium chloride, and this information will enable the physician to decide how much, if any, of this product is permissible daily in each individual case, while bearing in mind that only small quantities are required because of the intense flavours.

For similar reasons the diabetic is interested in variety and in some cases an extra source of vitamin B complex is said to be beneficial. Pure yeast extracts are normally very poor in carbohydrate, as is shown in Table I. Here again the individual case can be dealt with on its merits.

Conclusion.

The nutritive value of yeast extract is to be found in (a) the vitamin content, which makes it a useful dietary supplement, (b) the assimilable protein derivatives, particularly lysine, which improve the value of bread and other cereal proteins, and (c) the high flavour, which has "interest value" in certain invalid diets.

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SOME RECENT CONCEPTS IN THE ORTHOPAEDIC MANAGEMENT OF ACUTE POLIOMYELITIS.¹

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In the past it has been considered that the early weeks of acute poliomyelitis were the closed province of the physician or paediatrician. The orthopaedist did not enter the field until some six weeks after the onset, when the period of infectivity was supposedly over, pyrexia had abated and muscle spasm and tenderness had substantially, if not completely, subsided. It was not considered that anything of orthopaedic moment took place in these early weeks. This opinion was held by physicians and orthopaedic surgeons alike. However, recent research and observations into several aspects of poliomyelitis are showing that this disease should be tackled by a therapeutic team working together and not dividing themselves into water-tight compartments which hand the patient on from one to the other, without any form of combined consultation as to the early treatment.

Early Aggravation of Anterior Horn Cell Damage.

Ritchie Russell (1947, 1949, 1951, 1952) has drawn attention to the great importance of complete rest as regards active muscular activity once the onset of the "major illness" has occurred. He has shown that severe, and at times complete, paralysis has followed a period of strenuous physical exercise often in an effort to "work off" the sluggish feeling which frequently accompanies the early stages of the disease. This happening seems bound up in some way with the vulnerability of the anterior horn cell at this particular period. Sanders (quoted by Russell, 1951) has shown that the poliomyelitis virus, which enters the cell prior to the onset of paralysis, disappears or becomes undetectable for a period of some hours, after which chromatolytic changes occur in the cell, the virus reappears and paralysis ensues. The anterior horn cell either is destroyed completely or makes an apparently complete recovery in three or four weeks (Bodian, 1948).

This chromatolytic stage appears to affect the anterior horn cells at variable times early in the disease, and active muscular activity of any type during this stage is to be avoided at all costs. Before Russell drew our attention to the serious effects of muscular activity and brought to our notice the research of workers like Sabin, Sanders, Bodian and Horstman, few of us were aware that inestimable harm could be done in these early days when our thoughts were more fully occupied in treating a "sick" rather than a "paralysed" child. It now seems reasonably well proved that from the onset of meningitic symptoms until possibly two or three weeks later, all active muscular movement should be avoided.

It should therefore be from this early period that the orthopaedic surgeon's active interest in the patient begins. If he neglects to ensure that strict inactivity is observed in the first few weeks, then he must expect to see a more paralysed patient presented to him at a later stage.

¹ Read at a meeting of the New South Wales Branch of the British Medical Association on July 30, 1953.

Spasm and Tenderness.

Much controversy has arisen over the vexed question of "spasm" in poliomyelitis. Many dogmatic claims have been made that such and such a treatment is the panacea for this distressing condition. All seems settled until another group of workers is unable to confirm these claims, and they in their turn come forth with some other claim.

Firstly, many of us believe that this symptom complex varies in intensity from epidemic to epidemic, but even this statement is not without its ardent opponents. If this epidemic variability is the case, any evaluation of various forms of treatment must be made at the same period and not compared with happenings in past or future epidemics.

Research workers cannot agree on the site and method of production of "tenseness" in the muscles. It is agreed that spasm may occur in muscles which do not proceed to paralysis, and that it may or may not be present in muscles which subsequently become paralysed.

The doctrine put forward by Kabat and Knapp (1943) of damage to the internuncial neuron as the main cause of spasm was well received for a time; but examination of serial sections of central nervous system tissue have shown much coexistent involvement elsewhere at the same time, and Bodian (1947) has demonstrated that damage to the higher centres, particularly the medullary reticular formation, is present early in the disease.

Others have shown that meningeal involvement enters into this phenomenon, whilst others have nominated the sympathetic supply. Finally the motor end plates themselves have been held guilty of initiating the spasm. The isolating of the virus from other than nervous tissue has certainly widened the field for speculation, and the muscle tissues themselves could well show a reaction to virus presence.

From consideration of the extensive literature which has arisen upon this particular subject, and of the claims made for various treatments, one can only conclude that it is highly possible that more than one factor is operating, and that, according to the dominant one acting at the time, so some particular form of treatment gains its vogue. Thus procaine given intravenously, "Etamon", "Priscoline" *et cetera* all have their strong advocates. Probably combinations of various drugs, if not pharmacologically incompatible, would give the best results by a synergistic action at several sites.

Relief of the painful spasm by means of moist heat was advocated by Lovett in 1916, and as you all know, moist packs became the backbone, as well as the bone of contention, of the Kenny treatment. Whilst it is agreed that efforts should be directed to the overcoming of a painful disturbing spasm in a limb, the Kenny practice of making "spasm" the all-important concept of the disease against the anterior horn cell destruction cannot be upheld. The beneficial effect of moist packs is generally accepted, and this was shown by Hall, Manoz and Fitch (1947) to have its mode of action through the reflex arc rather than locally. After the application of hot packs over a muscle, direct stimulation gave rise to a lessened height of contraction in the muscle. If the posterior sensory roots from the muscle were severed or the skin was anaesthetized, this decrease did not occur; this indicates that the intact reflex arc rather than increased local hyperthermia *per se* was the mechanism concerned.

Moist packing is a very onerous and time-consuming practice, and if other equally effective methods can be found they will be most welcome.

Muscle Tenderness.

Muscle tenderness appears to exist quite apart from spasm, although the two may be combined. It is suggested that this is "fibrosis" of muscle fibres and may well be a direct localized reaction to viral invasion. It is likewise resistant to treatment and may exist in a muscle after spasm has subsided.

Respiration.

It is with interest that we learn of efforts to overcome the disadvantages of the orthodox respirator. The most difficult patients to rehabilitate are those who have been unfortunate enough to have to spend a period in one of these confined machines. Not only are the limbs stiff and painful, but the patient's spine is often like a ramrod, and it takes courage on the part of the patient and tenacity and perseverance on the part of the physiotherapist to overcome the effect of a few weeks in a respirator.

Some form of positive pressure apparatus is urgently required, and Bang (1953) is to be congratulated upon his efforts to provide such facilities.

The advice and help of the specialist anaesthetist are becoming more and more needed in the treatment of this disease, and a strong appeal is made for specialized teamwork in the handling of poliomyelitis patients.

Muscular Dysfunction.**Disuse Atrophy.**

Experimental evidence and clinical study confirm the observation that immobilization of even a normal limb will bring about retrogressive changes in muscles and bones, and this commences in the early days of inactivity. If the muscle is denervated, this atrophy is further accelerated. Avoidance of the added effect of "disuse" onto partially paralysed and unaffected muscles is a matter which demands attention. In the past, many patients have been kept steadfastly tied to their frames in the pious hope that some paralysed muscles would eventually improve. An earlier assessment of possible recovery, and a cutting of our losses where hopeless muscles are concerned will, I feel sure, give better eventual results.

Electrical Stimulation.

It has been widely shown experimentally that galvanic stimulation of denervated muscle delays and diminishes muscle atrophy. Guttman and Guttman (1942) show some convincing evidence to this effect in experiments on rabbits. They also found that treated muscles showed less fibrosis and larger muscle fibres with more definite striation than untreated muscle, and further, that when the nervous stimulus eventually returned, the muscles were capable of a better response.

However, these results relate mainly to peripheral nerve lesions, in which nerve recovery is a long drawn out procedure. In poliomyelitis, once the anterior horn cell is destroyed, there can be no reinnervation of the muscle fibres, and since we have already learned that the surviving anterior horn cell apparently returns to normal in three to five weeks, there seems little need for galvanic treatment. However, it is used in some clinics, and a recent report on an experimental series of patients treated at the Northwestern University Medical School is contained in *The British Journal of Physical Medicine* for May, 1950. This article is most informative to anyone interested in this subject, and if similar results can be obtained on a larger series of patients we should perhaps employ electrical stimulation at least once a day for the first 100 days; Jackson (1945) has shown that it is during this period that most atrophy occurs.

Reeducation.

It has already been stated that orthopaedic treatment should commence from the patient's admission to hospital, and total rest should be assured for the first two or three weeks. During this time no effort should be made to obtain a muscle chart; but from gentle handling and observation an idea of the affected muscle groups should be obtained.

Daily gentle passive movement of limbs should be carried out and the patient's position changed from prone to supine for a reasonable period once or twice a day.

Sedation should be employed freely, as sleep is by far the best treatment at this stage.

Spasm should be treated by moist heat; but if it is not sufficiently effective in severe cases procaine given intravenously, curarine or "Priscoline" *et cetera* should be tried.

After four weeks a full muscle chart should be prepared by the physiotherapist who will be responsible for the patient's after-care and reeducation. The ideal, as knowledge stands at present, is then for short regular periods of muscle reeducation to be given, stopping short of fatigue.

Ritchie Russell (1952) in his recent book has advocated exercise of all affected muscles to the point of fatigue as frequently as every hour for twelve hours a day after the first three weeks. Whilst being ready to readjust one's ideas to modern concepts, one feels that a much larger controlled series of patients is needed before this practice can be generally recommended.

Permanently Ineffectual Muscles.

As elsewhere in the body, a large reserve of functional tissue is present in the number of anterior horn cells supplying a limb. Bodian (1948) has shown in monkeys that one-third of the motor neurons to a limb may be destroyed without detectable weakness. Further, there are approximately 12,000 motor neurons supplying each limb, and in a severe case 8000 of these will be destroyed.

When muscle is subjected to continual stress, it responds by hypertrophy of the non-paralysed muscle fibres, and as was shown by Edds (1950) there is an associated increase in the size of the intact neuron and its fibre. It is upon these facts that reeducation is based.

Many muscles are often so poorly innervated that despite every effort to gain an anti-gravity grading they fail to respond. Any muscles which have shown no gain since the onset of treatment and are still graded at "0" to "2" after three months' adequate reeducation should be written off as hopeless. Appliances such as aeroplane splints should be discarded, and reeducation should be concentrated on developing what remains of limb function.

It is illogical to keep a patient confined to a frame indefinitely for weak back muscles which have shown no improvement despite treatment. Such back "protection", if one can call it that, is often carried out to the detriment of improved limb function, since the effects of disuse cannot be properly combated under such circumstances nor full reeducation methods applied. Similarly the prolonged wearing of a splint for a paralysed and hopeless deltoid muscle is detrimental to the advancement of useful forearm and hand function.

Conclusion.

Finally, a plea for a more rational attitude based on the future function of the patient as a whole, rather than on adherence to a stereotyped general plan of action, is put forward for consideration. Old precepts die hard, and, whilst we should not throw overboard the teachings of old masters without careful and critical examination of new ideas, let us take every advantage of recent research and be ever ready to bring fresh thought and study to the problems presented by this cruel and crippling disease.

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THE TREATMENT OF ACUTE PARALYTIC POLIOMYELITIS.¹

By S. E. J. ROBERTSON, M.B., M.R.C.P. (London), M.R.A.C.P., Honorary Assistant Physician, Royal Alexandra Hospital for Children, Sydney.

SUCH vast changes have occurred in the management of acute paralytic poliomyelitis in the last decade that the concept of the physician being in charge until the acute stage is over, when the orthopaedic surgeon takes charge, is greatly outmoded. It seems to be accepted generally that as soon as paralysis is detected the two should act in conjunction.

The general practitioner who first examines the patient is concerned with making a provisional diagnosis, arranging for treatment and dealing with contacts. Diagnosis should be confirmed by lumbar puncture mainly to exclude purulent meningitis for which specific therapy is urgent. Even if the cerebro-spinal fluid findings are typical of a virus infection, a final diagnosis of poliomyelitis can be made with certainty only if a lower motor neuron type of paralysis appears. Once a provisional diagnosis of poliomyelitis has been made, should the patient be sent to hospital? Since it is known that three-quarters of the family contacts are excreting virus in their stools by the time a case is diagnosed, there is little further danger to the rest of the family if the patient remains at home. Also, many patients suffering from virus infections of the nervous system, not poliomyelitis, are admitted to hospital and nursed alongside patients with proved poliomyelitis, from whom it may be contracted. It is possible that patients without paralysis and some mildly paralysed patients would be far happier and probably as well looked after if they were nursed at home. It would be necessary for fairly frequent searches to be made for extending paralysis or bulbar signs by the attending practitioner. The drawback to keeping mildly affected patients at home is that transport to hospital will be more hazardous if signs of extensive involvement or bulbar paralysis appear. If transport to a suitable hospital can be quick and comfortable, it is probably better to keep such patients at home. Of course, the treatment of any paralysis will be supervised by an orthopaedic surgeon.

During epidemics the virus is so widespread that isolation of contacts is virtually useless in preventing further cases. In view of the public dread of the disease it is wise to keep other children in the affected home away from school for two weeks.

The success of Hammon and his co-workers (1952) in providing passive immunity for a statistically significant number of children with γ globulin, and the attendant newspaper publicity, have raised a difficult problem. One pint of blood provides about one grammie of γ globulin, which is roughly the prophylactic dose, and the immunity attained lasts two to five weeks. To provide sufficient γ globulin to immunize the members of the population at risk during an epidemic, perhaps all those aged under twenty years every five weeks, would entail an enormous amount of blood.

¹ Read at a meeting of the New South Wales Branch of the British Medical Association on July 30, 1953.

There is no doubt that a long and tiring journey favours the extension of paralysis. Should hospital admission be decided upon, transport should be as rapid and as comfortable as possible, the patient should be lying down, not sitting, and air transport is advisable over long distances.

Having reached hospital, the patient passes into the care of a physician. A problem the latter has to consider is where the patient with poliomyelitis should be nursed. Should such a patient be nursed near to a general ward, should he be nursed in the infectious block of a general hospital, or should he be always admitted to a hospital for infectious diseases? In 1952 there was a great deal of correspondence on this subject in the *British Medical*

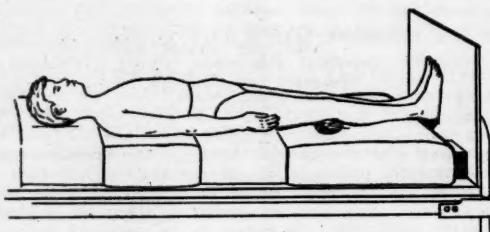


FIGURE I.

Journal. It was stated (Gale, 1952) that in 1949 there were 5423 admissions for poliomyelitis to infectious disease and general hospitals in England and Wales. Amongst these were 12 well-authenticated instances of cross-infection, a very small number. Of these 12, one case occurred in an infectious disease hospital. From this correspondence it would seem that cross-infection is very unlikely if poliomyelitis patients are nursed in a separate ward with proper precautions, such as the wearing of gowns, hand-washing *et cetera*. This ward should be in a hospital where orthopaedic, anaesthetic and surgical skill is readily available. It is best that the patient remain in the same hospital until convalescence is well under way.

Infection of the staff of the hospital is always a possibility. Such cases as do occur in nurses and doctors are very uncommon, often there is no history of actual contact with poliomyelitis patients, and very probably such



FIGURE II.

infections could well have been contracted outside. Proper precautions against cross-infection render infection among the staff most unlikely.

Paralysis may occur from one to fourteen days after the appearance of meningitic signs, and during this period it is vitally necessary to avoid any factors which may render the nerve cells more vulnerable. These factors include physical activity, local trauma, tonsillectomy, parenteral injections, transport over long distances, and upper respiratory infections. As it is now believed that the virus invades the nervous system before meningeal signs appear, such factors should be avoided, if possible, during and after any febrile illness of uncertain origin during epidemics.

No method of attacking the virus, once it has entered the nervous system, is at present available. It is known that viruses require enzyme systems in the normal cell for their own nutrition. Research is being directed at the moment at a method of interfering with these enzyme systems during infection rather than at an attempt to destroy the virus itself.

The use of intravenous injections of hypertonic solutions has been advocated in an attempt to reduce the oedema of the central nervous system. There is little enthusiasm for



FIGURE III.

this treatment, as it is assumed that any improvement occurring is due to relief of dehydration and promotion of nutrition by the injection of glucose. However, it has long been thought that the anterior horn cells may be destroyed by pressure from perivascular fluid, and recently it has been shown that particles of carbon injected into the subarachnoid space will enter the perivascular spaces in

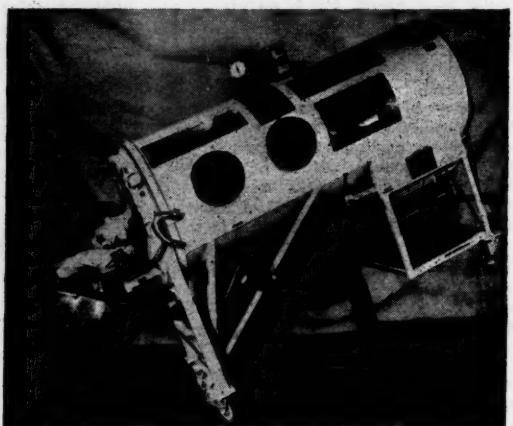


FIGURE IV.

the cord substance (Woolam and Miller, 1953). Therefore it is possible that promotion of flow outwards from the perivascular spaces to the subarachnoid space by intravenous injection of hypertonic solutions or by repeated lumbar punctures may be worth study in experimental animals.

Once paralysis has occurred, the orthopaedic surgeon should be consulted. It is wrong to wait till the end of the acute stage before seeking his help. He can best give advice as to the management of spasm, the amount of

passive movement of joints to be carried out and the best position in which to nurse the patient. Proper orthopaedic management from the beginning does much to prevent difficulties later. When active movement is to be allowed, and to what extent, are still matters of controversy. Once destruction of nerve cells occurs, it is quickly completed, and the surviving neurons appear normal in four to five weeks (Bodian, 1952). Ritchie Russel (1952) advocates that after this period paralysed muscles should be exercised to the point of fatigue twice a day. There has been some acrimonious discussion on this point in the correspondence columns of *The Lancet* this year.

The best way to nurse the patient is that illustrated in Figure I. The mattress should be firm with fracture boards beneath it. There should be two four-inch blocks between the base of the footboards and the mattress, and there should be no pillows. The feet should be firm against the footboard and a small roll placed behind the knees. This position with the shoulders and pelvis level and the back straight should be maintained as much as possible. Every

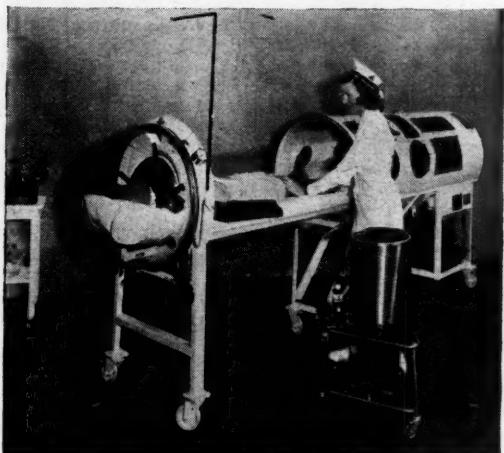


FIGURE V.

four hours the patient should be moved to the prone position with the toes in the space between the footboard and the mattress (Figure II). A roll should be placed under the ankles and pads under the shoulders. In the acute stage every effort should be made to make the patient relax as much as possible. Pain can be relieved by analgesics such as aspirin or codeine and slight drowsiness induced by barbiturates. Spasm can be relieved best by hot packs and passive movement of joints. Hot packs require a great deal of extra work, are fatiguing to the patient and have never prevented paralysis, but they usually relieve spasm. Various drugs have been tried to relieve spasm, but the intravenous administration of procaine seems to be the only one consistently successful. During the acute stage careful watch should be kept on the following: (i) temperature and pulse rate; (ii) rate and depth of respiration; (iii) any use of accessory muscles of respiration; (iv) difference between waking and sleeping respirations; (v) skin colour; (vi) mental alertness; (vii) regurgitation of fluids through the nose; (viii) dysphagia; (ix) rattling of mucus in the throat; (x) speech disturbances; (xi) bladder and bowel function; (xii) weakness or paralysis of any part of the body; (xiii) areas where the patient complains of discomfort; (xiv) positions assumed by the patient.

Retention of urine may respond to the use of a warm bed-pan with adequate support for the back and legs with pillows. The use of sympathetic nerve depressants such as "Carbochol" or "Prostigmin" may be effective. Intermittent catheterization is often necessary and usually

harmless, as the retention of urine is nearly always over in ten to fourteen days. Constipation is best neglected in the acute stage, and can be dealt with later by mild aperients and small enemas. The diet should be as tolerated. When the patient is very ill, parenteral administration may be necessary. Fluid and electrolyte deficiency can occur, so that the fluid intake should be watched and liberal salt added to the food.

It is most important to detect signs of respiratory insufficiency early. When insufficiency is due to weakness of the intercostal muscles or diaphragm, the first sign is unwillingness to talk in long sentences. A good method is

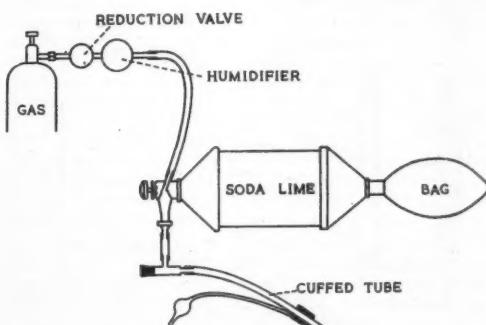


FIGURE VI.

to see how many numbers can be counted in one breath. The average patient can count to 20. The taking of serial spirometer readings is certainly the best method if it is available. Watch should be kept for the following: (i) rapid, shallow breathing; (ii) increased pulse rate; (iii) apprehension and anxiety; (iv) restlessness and inability to sleep despite fatigue; (v) inspiratory dilatation of the nostrils; (vi) use of accessory respiratory muscles; (vii) weakness of respiratory movement of ribs and abdomen.

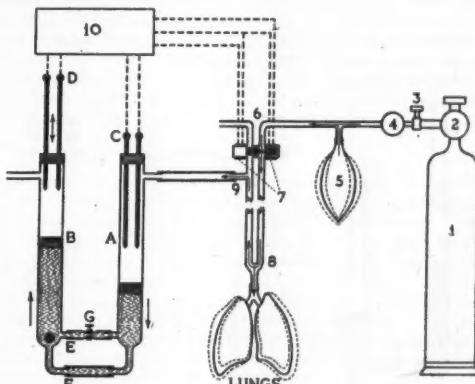


FIGURE VII.

Patients showing any evidence of weakness of the thoracic muscles should be placed in a tank type of respirator as soon as possible. If this is done early, fatigue of the surviving neurons supplying these muscles will be avoided.

Bulbar involvement is serious and should be detected early. Careful watch should be kept for the following: (i) visual disturbances; (ii) facial paralysis; (iii) nasal quality of the voice, hoarseness or aphonia; (iv) regurgitation of fluids through the nose; (v) difficulty in swallowing; (vi) accumulation of secretions in the pharynx; (vii) inability to cough or expectorate; (viii) noisy breathing.

If respiratory insufficiency is allowed to exert its effects unchecked, anoxæmia will occur, with changes in the normal functioning of the central nervous system. These will be shown by the following: (i) increasing restlessness and anxiety; (ii) fatigue; (iii) rapid, irregular pulse of small amplitude; (iv) irregular rate and depth of respiration; (v) elevation or sudden drop in blood pressure; (vi) cyanosis; (vii) confusion; (viii) coma; (ix) peripheral circulatory failure.

insufficiency, and very probably pulmonary oedema. If inability to cough is added, secretions will also collect in the bronchi. If there is inability to swallow with or without inability to cough and there is no thoracic weakness, postural drainage in the prone position with pharyngeal suction is all that is necessary, and the foot of the bed should be raised on two chairs (Figure III). If thoracic weakness is also present, as it often is, the respirator should be used. The "Emerson", an American

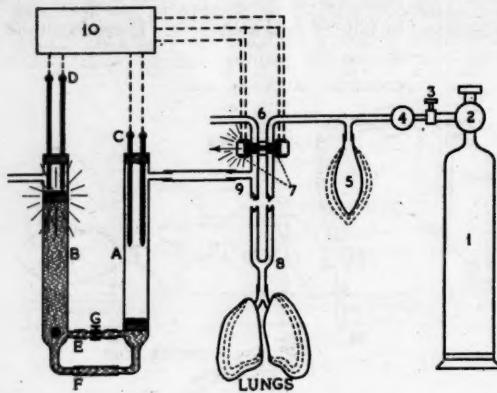


FIGURE VIII.

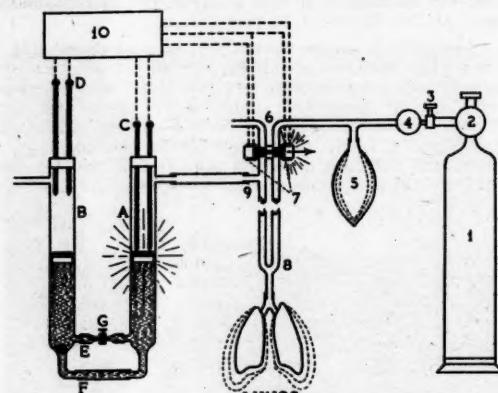


FIGURE X.

These signs indicate an advanced degree of anoxæmia, and may be closely imitated by damage to the respiratory and cardiac centres in the medulla. Damage to these centres may be due to the virus or to anoxæmia, and the distinction is largely academic.

Distinction as to the cause of the respiratory insufficiency may be difficult, but an effort should be made, as application of the wrong therapy may be disastrous. Thoracic paralysis is from weakness of the intercostal muscles and diaphragm because of damage to neurons in the cervical and thoracic parts of the cord. Treatment consists of

type, in which provision has been made for placing the patient in the prone position inside the respirator, is illustrated (Figure IV).

Postural drainage of patients with pharyngeal and adductor laryngeal paralysis is an ideal to be aimed for, but its success demands a quiescent patient and very experienced nurses. These may be hard to obtain, and if satisfactory removal of secretions cannot be obtained by postural drainage and suction, tracheotomy must be carried

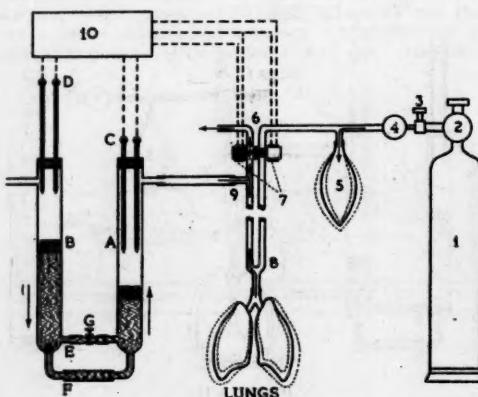


FIGURE IX.



FIGURE XI.

artificial respiration in a tank type respirator, although a cuirass type respirator may be effective for short periods.

Pharyngeal paralysis results from damage to vagal nuclei in the medulla and causes inability to swallow, with accumulation of secretions in the vicinity of the opening of the larynx. This pooling of secretions is the essential cause of the respiratory difficulty. If such a patient is placed in a tank type of respirator without provision of means to prevent secretions from entering the larynx, inhalation will follow, with atelectasis, more respiratory

out forthwith. But it must be remembered that even with tracheotomy it is not necessary to place the patient in a respirator unless there is weakness of the thoracic muscles.

In a previous paper (Robertson, 1952), mention was made of positive pressure artificial respiration, which is stated to be just as effective as the negative pressure type in producing alveolar ventilation and in preventing pulmonary oedema and atelectasis. Positive pressure is

applied by means of a face mask in conjunction with an Oxford inflator or a McKesson resuscitator, or by an air-tight dome attached to the head end of a tank type respirator. The use of this last method is illustrated (Figure V); but it has the disadvantage of causing unpleasant ear symptoms. I am sure that the cooperation of anaesthetists would be helpful in the use of this method of artificial respiration.

The experiences in Denmark in an epidemic in 1952 (Lassen, 1953) would seem to have established positive pressure respiration as a method to manage these patients. This was a severe epidemic and is worth considering in some detail. During five months, 2722 patients of all ages were admitted to one hospital, 866 being paralysed. Of the 866 paralysed patients, 316 required treatment for respiratory insufficiency, and 250 tracheotomy operations were performed. In the first month of the epidemic 31 patients had respiratory insufficiency, and 27 of these died, having been treated by the methods already outlined. After consultation with an anaesthetist it was decided to use positive pressure respiration through a high tracheotomy as soon as postural drainage and suction could no longer maintain a free airway. The simple apparatus used is illustrated (Figure VI). Without premedication, under cyclopropane anaesthesia, a tracheal tube is passed first to ensure an adequate airway during the operation. Ether given by the "open" method is also suitable. A square hole is then cut in the trachea, as high as possible, through which the main bronchi are aspirated while the lungs are pounded and squeezed to loosen mucus plugs. The widest possible cuffed tube is then inserted to prevent aspiration from above. This is connected to a cylinder supplying equal amounts of nitrogen and oxygen, pure oxygen or air at a rate of five to 10 litres a minute. The bag is then manually compressed from 16 to 30 times a minute according to age, the lungs deflating by passive elasticity. This apparatus was found to be cheap and easily manufactured, it produced adequate ventilation, prevented aspiration from the pharynx and did not prevent nursing procedures, clinical examination, physiotherapy and changes of position. I am sure the orthopaedic surgeons would approve of the ease of applying physiotherapy. Its disadvantages were the possible insufflation of soda lime, possible hyperventilation with alkalosis or emphysema, difficulty in "weaning" the patient to normal breathing, and the necessary provision of trained personnel to insufflate the bag twenty-four hours a day. The last difficulty was solved by using medical students, of whom 200 were required each day when there were 40 to 70 patients requiring artificial respiration during the worst period. However, it was worth all the effort, as the mortality rate from respiratory insufficiency was reduced from 80% to 20%, and this represented a saving of about 100 lives.

The problem of the mechanical "student" appears to have been solved by the invention of an apparatus which will be briefly described (Bang, 1953; Figure VII). The respiratory gas (1) passes through a manometer (2), a tap (3) and a flowmeter (4) to a bag (5) at a rate of seven to 10 litres a minute. The bag becomes distended during expiration and compresses gas into the lungs during inspiration at a pressure of 130 to 190 millimetres of water. Inspired and expired air passes through the same valve (6). In the valve is a piston, which allows gas to pass into the lungs or expired air to the outside. The piston is moved by magnetic fields produced by the two coils (7). Connected to the valve is a Y-tube (8) leading to the tracheotomy tube. One limb of the Y-tube is connected to a side tube (9), which passes to the controlling mechanism. Tube A is air-tight and is connected to B, which is open to the air. A and B contain a non-volatile fluid of viscosity equal to that of water. On the surfaces of the fluid in these connecting tubes rest floats which make an electrical connexion when they make contact with electrodes C and D. C is set permanently so that contact occurs when the levels of fluid are equal. D is adjusted according to the pressure within the lungs at which it is desired that expiration will begin. When the floats make contact with the electrodes,

a current passes through the booster (10), causing movement of the piston in the valve (6).

A and B are connected by means of two tubes, E and F. During inspiration, fluid passes from A to B by both tubes. During expiration, fluid passes from B to A; but connecting tube F is blocked off by a small ball, and flow can occur only through connecting tube E. Flow through connecting tube E can be retarded by adjustment of screw G. Thus expiration can be made twice as long as inspiration, which is the desired ratio.

Inpiration (Figure VII) begins with the piston at the right. The distended rubber bag presses gas into the lungs. The pressure in the Y-tube rises so that fluid is pushed from A into B through both connecting tubes unhindered by the little ball, and the float, in B, rises. When this float touches the electrodes D, a current flows through the left-hand coil moving the piston over to the left (Figure VIII). Expiration now begins. The elastic recoil of the lungs presses gas into the outer air through the valve, and the pressure in A falls. Fluid flows from B to A hindered by the ball and the screw valve (Figure IX), so that expiration is slower and there is a physiological expiratory pause. When the float touches M1, the piston passes to the left, expiration ends and inspiration begins (Figure X).

With this ingenious apparatus all the adjustments necessary for successful artificial respiration can be obtained. By adjusting the rate of flow from the cylinder, one can alter the rate of respiration. By adjusting the flow from B to A with the screw G, one can alter the ratio of inspiration to expiration. Finally, by adjusting the height of the electrodes D, one can fix the maximal pressure in the lungs at the end of inspiration.

This machine is shown at a patient's bedside (Figure XI). It is cheap, easy to make and not bulky. It has been very well received in Great Britain, and it would seem to be a definite advance in the therapy of respiratory insufficiency.

Conclusion.

In conclusion, I should like to make a plea that teamwork is essential in the treatment of paralytic poliomyelitis. The physician, orthopaedic surgeon, anaesthetist and laryngologist all have special knowledge to bring to bear on this problem. They need to be helped by nurses who are experienced in the handling of such patients, who can reassure them, who can aspirate the pharynx gently but firmly, and who can recognize early signs of respiratory insufficiency. The apparatus to be used by this combination must be the best and the most modern that is obtainable.

Summary.

A review of some recent advances in the treatment of paralytic poliomyelitis is given. Brief mention is made of such questions as the isolation of contacts, passive immunization, disposal of the patient and his transport to hospital if necessary. The question of cross-infection and its prevention is discussed. The nursing of the patient and signs of complications are described. The treatment of respiratory insufficiency is gone into, and a method of applying positive pressure artificial respiration is described. Finally, a plea for greater teamwork in the management of paralytic poliomyelitis is made.

Acknowledgements.

I am indebted to Dr. Claus Bang, of Skive County Hospital, Denmark, for permission to reproduce Figure XI; to Mr. R. B. Dunphy, of the Department of Medicine, University of Sydney, for his drawings of Figures I, II, VI, VII, VIII, IX, and X; to Mr. J. T. Sheridan, of the Royal Alexandra Hospital for Children, for the photograph in Figure III; and to the J. H. Emerson Company, of Cambridge, Massachusetts, United States of America, for permission to reproduce Figures IV and V.

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ANTITHYROID THERAPY: CLINICAL TRIALS WITH "MERCIAZOLE."¹

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SOME experiences are here described with a recently introduced antithyroid agent whose official name is methimazole (1-methyl-2-mercaptoimidazole). Synonymous trade names are "Mercazole" (Schering) and "Tapazole" (Lilly). Its essential nuclear structure is a 5-membered ring, and it thus differs from thiouracil and its methyl and propyl derivatives with their 6-membered ring (Figure I). However, the chemical linkage responsible for the antithyroid potency is probably the same, being the old thiourea portion of the nucleus characterized by the sulph-hydryl group.

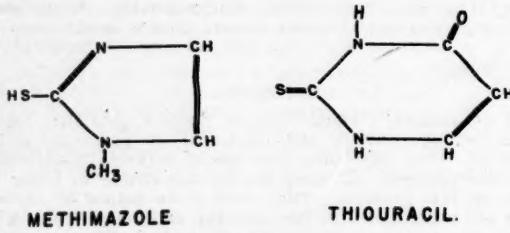


FIGURE I.

In the carrying out of the clinical trials, the antithyroid potency of "Mercazole" had to be ascertained and a working scheme of dosage established. Watch also had to be kept for toxic side effects. It was originally claimed that "Mercazole" was one hundred times as potent as thiouracil. Thus on the basis of a thiouracil dosage of 300 milligrammes per day, only three milligrammes of "Mercazole" would be required. Our initial dosage was four to eight milligrammes per day, but it was soon apparent that this was inadequate, and like many other workers (Table I) we had to resort to larger doses.

Principles of Antithyroid Therapy.

As is seen in Table I, the dosage of "Mercazole" used has varied widely, from four to 60 milligrammes per day. In individual cases also the dose given has been greatly altered at different stages in the treatment. It is relevant to examine some of the factors involved in arriving at an estimate of the required dose of antithyroid agent. It may be accepted that the aim of antithyroid therapy is to restore the patient to a euthyroid state by the use of the minimum daily dose of the agent.

The intensity of hyperthyroidism, rather than the size of the goitre, is the governing factor in the dosage. Thus, for long-standing nodular goitres with moderate toxicity the dose required is usually smaller than for the less bulky toxic diffuse goitres of Graves's disease.

Traditionally there have been two stages in treatment, the stage of control (restoration to euthyroidism) and the stage of maintenance. During the former, the dosage is sufficient completely to block hormone synthesis. Thus complete control is obtained with maximal speed. During the latter, the dose is reduced, the follicles being allowed to elaborate enough hormone to meet the body's normal requirements.

It is probable that, in order to achieve and maintain a euthyroid state in the patient with severe thyrotoxicosis, hormone secretion must be reduced by some 80%. Certainly surgical removal of less than 80% of the gland is often followed by persistent thyrotoxicosis. Thus, the antithyroid dose for control at maximal rate (with complete inhibition) cannot greatly exceed that required for maintenance (with 80% inhibition). It is likely, therefore, that the heavy doses frequently given for short periods at the beginning of treatment serve no useful purpose and only increase the toxic hazards. Moreover, to obtain control of thyrotoxicosis is seldom a matter of urgency, and it may be doubted whether anything more than the maintenance dose should ever be prescribed.

Like Astwood (1951), we have been content to use a controlling dose which is little more than the estimated maintenance dose, and there has been no evidence that this has been harmful or has unduly prolonged the stage of

TABLE I.
Summary of Clinical Trials with Mercazole.

Author.	Year.	Number of Patients.	Daily Dosage (Milligrammes.)	Toxic Reactions.
Beierwaltes . . .	1950	10	40 to 60	None.
Taylor <i>et alii</i>	1951	23	30 to 60 with Iodine.	None.
Astwood . . .	1951	2	15 to 20	None.
Barlets and Sjögren.	1951	100	20 to 50	In seven cases (in six cutaneous, in one granulocytopenic).
Hallman and Bondy.	1951	35	20 to 40	None.
Croke and Berry.	1952	1	38 to 60	Agranulocytosis.
Schermann and Escotegny.	1952	10	5 to 30	
Kendrick <i>et alii</i>	1952	32	15 to 45	In three cases (skin eruptions).
Klippen . . .	1952	50	12 to 24	In four cases (in three skin rashes, in one granulocytopenia).
Irwin <i>et alii</i>	1952	45	15 to 60	In three cases (in one fever and rash, in one nausea and vomiting, in one leucopenia).
Isbister and Rundle.	1954	36	4 to 32	In five cases.

control. Whatever the initial dosage, there are two factors delaying the patient's response—firstly, the hormone already present in the gland at the inception of treatment, and, secondly, that circulating in the body fluids and present in the tissues. Previous iodine therapy increases the amount of hormone stored in the follicular colloid, but decreases that in circulation.

Figure II shows two theoretical curves. The one indicates the effect of complete block of hormone synthesis with continued full doses of antithyroid agent. In untreated thyrotoxicosis, it is similar to the decay curve of metabolism following cessation of overdosage with thyroid extract in an athyrotic subject. This curve crosses the normal range of metabolism in approximately three or four weeks (Rawson *et alii*, 1944). The other shows the ideal curve to be aimed at in clinical practice. Blockage of hormone synthesis is never quite complete, and the curve of decline of metabolism is not of maximal slope. The moderate doses used must be continued for slightly longer periods (five or six weeks) to achieve control, but stabilization within the normal metabolic range is more easily achieved. We have usually reduced the controlling dose by one-fifth after six weeks for maintenance therapy.

¹We are indebted to British Schering Limited, for kindly supplying "Mercazole" for these clinical trials.

We have used "Mercazole" in the treatment of 36 patients, the data from whom are summarized in the appendix. The diagnosis of thyrotoxicosis was made after careful clinical assessment, and the patients were nearly all examined at intervals of one or two weeks throughout treatment. The extent of the therapeutic response has been largely estimated from the relief of symptoms and gain in weight. Measurements of the basal metabolic rate have been made to compare with the clinical assessment in doubtful cases. The strong antithyroid potency and the relatively low toxicity of "Mercazole" have been fully confirmed.

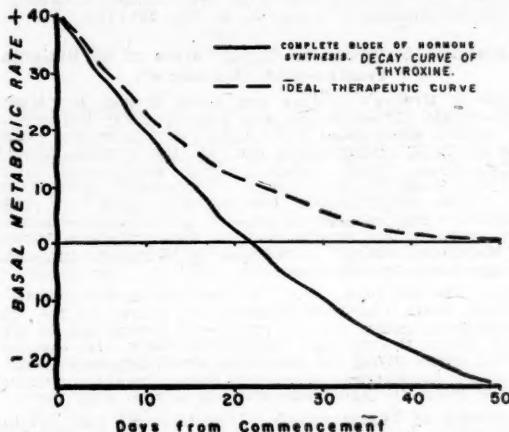


FIGURE II.

Reports of Cases.

CASE I.—This was a case of toxic diffuse goitre. R.A.B., a male subject, aged twenty-one years, complained of muscular weakness, breathlessness on exertion, and constant hunger, of four months' duration. In the past two or three months he had lost two stone in weight, though he had eaten big meals and frequent snacks between meals. His motions were looser and more frequently passed than normal (four times daily).

He presented the typical picture of severe primary thyrotoxicosis. There were bilateral lid retraction, a diffuse goitre with a bruit, a warm flushed skin, quick nervous movements, tachycardia (pulse rate 104 per minute), and tremor. The basal metabolic rate reading was +42%. He was given 18 milligrams of "Mercazole" daily with a prompt and satis-

CASE II.—This was a case of toxic nodular goitre. The patient, a married woman, aged sixty years, had had symptoms of severe thyrotoxicosis for four years and had been treated at different times with thiouracil, methyliouracil and propylthiouracil. The greatest duration of treatment was six months and the longest period of relief was ten months. Her two most striking symptoms, when thyrotoxicosis was uncontrolled, were loss of weight and diarrhoea (up to 24 motions per day).

She was treated with "Mercazole", as an in-patient. After two weeks on a dosage of eight milligrams per day, she felt steadier and stronger, but her weight was unchanged and her diarrhoea persisted, though the number of motions had fallen from 12 to six per day. The dose of "Mercazole" was then increased to 12 milligrams per day. In the following two weeks she gained half a stone in weight and became symptom-free. There was, in fact, a tendency to constipation. After six weeks' treatment the basal metabolic rate had fallen from +26 to -6%. She was maintained on a dose of 12 milligrams of "Mercazole" per day for a further period of eight weeks, after which subtotal thyroidectomy was performed and the post-operative course and convalescence were uneventful.

What Toxic Side-Effects Are There with "Mercazole"?

Of the first 1000 patients treated with supplies of "Mercazole" from Eli Lilly, 4.8% had drug reactions, mostly involving the skin, and including maculo-papular rashes and urticaria (Bartels and Sjogren, 1951). Recently, Croke and Berry (1951) have reported agranulocytosis occurring during methimazole therapy. The dosage in their case was 38 milligrams per day for eleven weeks followed by 60 milligrams per day for two weeks, when she became gravely ill. In our small series one patient has shown fairly severe neurotoxic symptoms, and in four others there have been possible minor reactions.

The first-mentioned patient was aged sixty-eight years. She had a toxic nodular goitre and auricular fibrillation. Previously she had proved intolerant to methyliouracil, but was maintained in a euthyroid state with small doses of propylthiouracil—namely, 100 milligrams per day. "Mercazole", four milligrams per day, was substituted for this, and seventeen weeks later she complained of severe giddiness and nausea. The giddiness caused her to fall on several occasions. As she put it, things seemed to be reeling round and she could not keep her balance. Omission of "Mercazole" was associated with relief of these symptoms, but they recurred when it was commenced again.

Of the four patients with minor symptoms, one complained of excessive salivation with an unpleasant salty taste in the mouth. In another case anorexia and nausea occurred, and in the third there was a transient urticarial rash. In the fourth coryza and headache developed. However, in one of the four cases there was reasonable doubt as to the causal role of "Mercazole".

Are the Quoted Incidences of Toxic Reactions Minimal?

Table II lists the better known antithyroid drugs, their dosage and the incidence of toxic reactions. It is no longer justifiable to use thiouracil, thiourea or thiobarbital in routine practice because of the frequency of toxic reactions. We are thus left with propylthiouracil, methyliouracil and "Mercazole". The data in Table II suggest that propylthiouracil is the safest of these, but it is pertinent to ask whether methyliouracil and "Mercazole" have been given in the correct—that is, the minimum effective—dosage. There is, in fact, much evidence that the dosage commonly used has been excessive and that, therefore, the incidence of toxic reactions has been unnecessarily high. We believe that in practice a daily dose of 150 milligrams of methyliouracil or 20 milligrams of "Mercazole" should rarely be exceeded. As has been indicated above, the controlling dose of antithyroid agent need not greatly exceed that required for maintenance. But in published work the former has often been five to ten times greater than the latter, and we suggest that the fault lies not in defective maintenance but in too high an initial dosage. A further considerable disadvantage is that *overdosage, leading to therapeutic hypothyroidism, causes enlargement and increased vascularity of the goitre unless these be forestalled by the simultaneous administration of exogenous thyroid extract in nicely regulated doses.*

factory response. In less than two months he gained 16 pounds in weight and was euthyroid, with complete relief of symptoms, though the goitre had enlarged slightly. Five weeks after the commencement of "Mercazole" therapy he developed a generalized urticarial rash with severe itching. "Mercazole" was suspended and pyribenzamine was prescribed. The urticaria subsided rapidly, and "Mercazole" therapy was resumed after a break of only two days. No further skin eruption developed. Some two weeks later, in preparation for thyroidectomy, he was given two grains of potassium iodide daily in addition to 18 milligrams of "Mercazole". At operation the state of the thyroid gland was similar to that found after courses of other thyroid drugs and iodine, and the patient's post-operative course and convalescence were uneventful.

TABLE II.
Antithyroid Drugs.

Drug.	Dosage. (Milligrams.)	Incidence of Reactions.
Thiouracil	200	10.0%
Thiourea	200 to 300	16.0%
Thiobarbital	50	30.0%
Propylthiouracil	200 to 400	1.6%
Methyliouracil	100 to 200	<5.0%
"Tapazole" (1-methyl-2-mercaptopimidazole)	20 to 30	4.5%
Carbimazole	5 to 25	<5.0%

It is well to remember that, for reasons given above, there is inevitably a delay of some weeks before the clinical response is complete. Such delay is not an indication to double the dose. But if, after four to six weeks, the response is slight or absent, the diagnosis of thyrotoxicosis should be reconsidered.

Iodine as an Adjuvant to Antithyroid Therapy.

Toxic reactions can be reduced still further if iodine is used as a supplement, because this usually enables the antithyroid dosage to be reduced by up to 50%. When surgery will ultimately be necessary, we have been inclining more and more towards the simultaneous administration of antithyroid agent and iodine from the beginning of treatment. With the reduced dosage of the former then necessary, hypothyroidism is unlikely to be induced. It should be emphasized that iodine given during a phase of therapeutic hypothyroidism, and consequent thyroid enlargement and fixation as to cause severe pressure symptoms and to render thyroidectomy difficult and hazardous.

Place of "Mercazole" in Treatment.

It is clear from this and other studies that in "Mercazole" we have a further very effective antithyroid agent. Used in the doses here advised, it is quite safe but not free from occasional unpleasant side effects. The same applies to the thiouracil derivatives, and it is valuable to have this third agent to call on, since a patient who is sensitive to both thiouracil derivatives may yet tolerate "Mercazole", as in the following case:

E.S., a married woman, aged fifty years, presented with a toxic diffuse goitre associated with pronounced ocular changes. Methylthiouracil and propylthiouracil in moderate doses controlled her thyrotoxicosis, but with both she developed small painful ulcers on the tongue and inner aspects of the cheeks. When these agents were omitted the ulcers healed, but her thyrotoxicosis recurred. Ulceration reappeared when administration of the thiouracils was resumed.

In June, 1951, "Mercazole" administration was started in daily doses of six milligrams. This sufficed gradually to control her thyrotoxicosis. She remained under treatment for nearly a year and was quite free from buccal ulcers during the whole of that time. "Mercazole" therapy was finally suspended, and she remains in a clinical remission.

Summary.

1. Previous clinical trials with "Mercazole" are summarized, experiences in its use are described, and a scheme of dosage is recommended.

2. The principles underlying antithyroid therapy are discussed.

3. Whatever the antithyroid agent used, or the dosage, there is inevitably a time lag of several weeks before complete control of thyrotoxicosis is achieved.

4. It is suggested that it is irrational and unnecessary to use controlling doses much greater than those necessary for maintenance.

5. The simultaneous administration of reduced doses of antithyroid agent and iodine lowers the incidence of toxic hazards and of therapeutic hypothyroidism.

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Appendix: Summary of Clinical Data of 36 Patients Treated with "Mercazole".

Type of Graves's Disease and Daily Dosage of "Mercazole".—Toxic diffuse goitre was present in 21 patients—13 females and eight males. The dosage of "Mercazole" ranged from six to 32 milligrams per day, the average being 13 milligrams. Toxic nodular goitre was present in 12 female patients; the daily dosage of "Mercazole" ranged from four to 24 milligrams, the average being nine milligrams. The ophthalmic type of goitre was present in three patients, two females and one male; the daily dosage of "Mercazole" ranged from eight to 16 milligrams, the average being 12 milligrams.

Age.—The age range over the whole group was sixteen to sixty-six years, the average being 40.3 years. In the toxic diffuse goitre group the age range was twenty-one to fifty-seven years, the average being 30.9 years. In the toxic nodular goitre group the age range was thirty-five to sixty-six years, the average being 49.2 years. In the ophthalmic type of goitre the age range was nineteen to sixty years.

Intensity of Thyrotoxicosis.—Thyrotoxicosis was classified as severe if the weight loss exceeded two stone, the heart rate 110 per minute, or the basal metabolic rate +40%. Thyrotoxicosis was severe in 18 patients, 14 of whom had toxic diffuse goitres. The daily dose range of "Mercazole" was six to 32 milligrams, the average being 16 milligrams. Thyrotoxicosis was mild or moderate in 18 patients; the daily dose range was four to 24 milligrams and the average was eight milligrams.

Ocular Changes.—Ocular changes were present in 23 cases. Lid retraction decreased after "Mercazole" therapy in nine. The average exophthalmometer reading increased by 0.7 millimetre with therapy in eight cases.

Complications.—Non-thyrotoxic complications—for example, hypertension, asthma, diabetes—were present in 12 cases. Thyrotoxic complications—for example, auricular fibrillation and glycosuria—were present in four cases.

Previous Treatment.—No previous treatment had been given in 25 cases. Other antithyroid drug therapy, with or without iodine, had been given in 11 cases.

"Mercazole" Therapy.—The duration of "Mercazole" therapy varied from four weeks to eleven months, the average being seventeen weeks. The time required for restoration of the patient to euthyroidism varied from four to ten weeks. Thyrotoxicosis was controlled with "Mercazole" alone in 26 cases. A change to "Mercazole" after control by another agent was made in 10 cases.

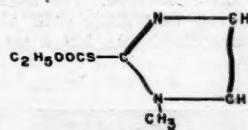
Therapeutic Hypothyroidism.—Therapeutic hypothyroidism developed in six patients; all had toxic diffuse goitres treated with relatively large doses of "Mercazole". In two cases enlargement of the goitre was noted.

Drug Reactions.—In one case neurotoxic symptoms developed on a daily dosage of four milligrams for seventeen weeks; "Mercazole" therapy was discontinued. Salivary symptoms occurred in one case on a daily dosage of 12 milligrams for two weeks; "Mercazole" therapy was continued. In one case severe nausea and "an awful taste in the mouth" developed on a daily dosage of 12 milligrams for two weeks; the symptoms subsequently subsided despite continued treatment. In one case an urticarial rash occurred with a daily dosage of 18 milligrams for two weeks. The symptoms were relieved by the omission of "Mercazole", and did not recur when treatment was resumed.

Method of Using "Mercazole".—"Mercazole" was used in the following three ways: (i) as pre-operative treatment for 17 patients (supplemented with iodine towards the date of operation); (ii) as maintenance treatment for 14 patients (four of these are awaiting admission to hospital for thyroidectomy); (iii) in conjunction with radio-iodine therapy in five cases.

Addendum.

Since this paper has been in the press, some clinical experience has been gained with the use of carbimazole (2-carbethoxythio-1-methylglyoxaline), or "Neo-mercazole" (Schering). (Figure III.)



CARBIMAZOLE.

FIGURE III.

The experience of others (Lawson and Barry, 1951; McGregor and Miller, 1953; Doniach, 1953; and Poate, 1953) suggests that "Neo-mercazole" may be the antithyroid drug of choice. It appears that it is less prone to produce toxic effects, and that a more prolonged and steady antithyroid effect is obtained owing to its slow release.

"Neo-mercazole" has been used in the treatment of 11 patients suffering from thyrotoxicosis, and we have found it to possess antithyroid activity of the same order as that of "Mercazole". No toxic or side effects have occurred.

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PRELIMINARY REPORT ON A MODIFICATION OF THE OBSTETRIC FORCEPS.

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 Memorial Hospital, Sydney.*

THE present modification of the forceps will, I hope, be the forerunner of other ideas and an inspiration to others to give critical help. The forceps as modified have been used in the mid-forceps operation only.

Description.

The modification (Figure I) consists of rubber bags modelled to be slipped on, and therefore to fit, each blade of any Simpson or Neville Barnes type of forceps. Their lateral outer side is smooth and of firm fabric-impregnated rubber and is non-elastic. The medial inner side is of rubber and is inflatable. The proximal ends are streamlined to fit around the shanks and are tied firmly there with tapes.

At the proximal end, between the fenestrae of the blades, emerges a fine rubber tube. When the forceps have been applied in the usual manner, care is exercised to see that the tubes are not pinched. These tubes are then connected in circuit with a mercury pressure manometer and a sphygmomanometer bulb. A screw clip is used for closing the circuit.

When the tubing is connected the bags are inflated to a reading of four centimetres of mercury. The screw clip is then fastened tightly, the system thus being closed to contain this pressure. At this pressure the bags are not tightly inflated, but will billow around the head of the fetus as a "Dunlopillo" pillow fits an adult's reclining

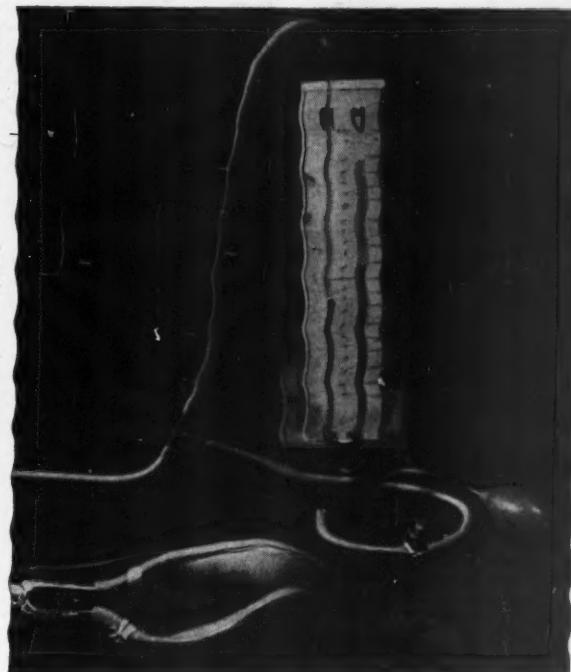


FIGURE I.
 Showing apparatus assembled, with mercury manometer at 2.0 centimetres. The rubber bags are inflated. The screw clip near the sphygmomanometer bulb has been tightened.

head. There is a sufficient air pillow to prevent contact with the hard steel of the forceps.

This having been done, traction of delivery is carried out in the usual manner.



FIGURE II.
 Antero-posterior skiagram of the head of a full-term, stillborn baby, weighing seven pounds two ounces. This fetus died three hours before a normal delivery. The cause of death was anoxia due to accidental hemorrhage. The course of labour was normal.

Rationale.

This modification has the following advantages: (i) It maintains the elasticity of the baby's skull. (ii) It does not interfere with the plasticity of the skull. (iii) It prevents dangerous degrees of distortion, thereby protecting the dural septa.

The average force of traction by the forearms of the operator, using forceps, is up to 50 pounds (the limit of safety). This delivers to the skull at the contact areas

excellent condition. Careful examination showed no damage to the maternal passages.

The number of cases is too small to prove conclusively the worth of the modification, but the results so far are very encouraging.

After use the tape is severed. The bags are washed in hot water containing detergent, then sterilized in the autoclave. They are disposable, but a set should last for twenty-four cases.

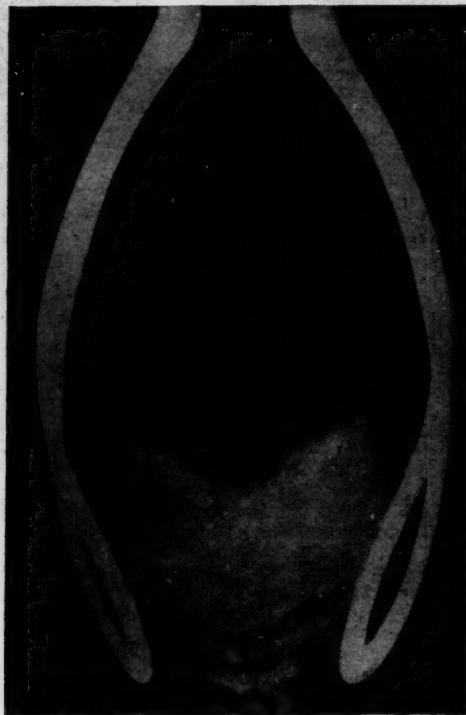


FIGURE III.

Skilogram showing head of fetus in Figure II with Neville Barnes forceps, applied cephalically, along the vertico-mental diameter and locked in the usual way. No traction used. Note head moulding or distortion of parietal bones with overlapping.

of the blades of ordinary type forceps pressure of between 25 and 50 pounds per square inch, depending on this area of immediate contact.

The inflated bag distributes the force over the full area covered by the application of the forceps blades, and the pressure on this area will not exceed 2.5 pounds per square inch when the bag is inflated to a manometer reading of 14 centimetres of mercury. Furthermore, the inflated bag fits the contours of the soft tissue and skull, giving a strong grasp which prevents slipping. (See X-ray pictures, Figures II, III and IV).

When the handles are clenched together, the cushion-like sensation transmitted to the hands of the *accoucheur* imparts a sense of confidence.

Comment.

The modified forceps have been used by myself and two other obstetricians in 12 unselected cases in which mid-forceps application was required. The applications made were cephalic on vertex presentations, with the occiput anterior. Delivery in each case presented no special difficulty. Four of the cases were described as "hard pulls". In every case the baby was delivered unmarked and in

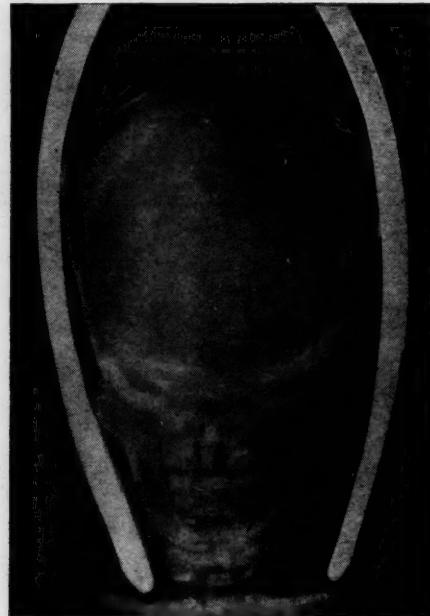


FIGURE IV.

Same application as in Figure III, but the blades of the Neville Barnes forceps have been fitted with the inflatable bag at a reading of 4.0 centimetres. Note the absence of distortion of the skull, and the way in which the bag fits the side of the head's irregular contour.

Acknowledgements.

My thanks are due to Professor A. B. Stephens and Mr. Peter Joubert, of the Engineering School, University of Sydney, from whom the ideas originated and by whom the mechanical problems were solved, to the Dunlop Rubber Company of Australia, and to Dr. G. M. Parkin and Dr. R. P. Shearman for their skilful cooperation.

Reviews.

Hormonal and Neurogenic Cardiovascular Disorders: Endocrine and Neuro-Endocrine Factors in Pathogenesis and Treatment. By Wilhelm Raab, M.D., F.A.C.P., F.A.C.C., F.C.C.P.; 1953. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9" x 6 1/2", pp. 744, with 86 illustrations. Price: £8 1s. 3d.

IN the last decade great progress has been made in the separate studies of endocrinology and cardiology, and the possible links between these two disciplines have been largely ignored by specialists in each field. Dr. Wilhelm Raab, however, has been interested in both disciplines, and his new book is an attempt to integrate these two fields and to speculate on further connexions which are at present ill defined or unsuspected. The author advances many unusual ideas, some of which have been published in previous papers, and their impact on the more conservative and particularly those who feel smug over their mechanistic approach to

cardiology is likely to be violent. Few people will agree with all Dr. Raab writes, but fewer still will deny that his ideas are stimulating and unconventional and may contain more than a grain of truth.

The book is divided into three parts. The first part deals with the experimental cardio-vascular effects of hormones and neurohormones, the second with cardio-vascular features in endocrine and neuro-endocrine syndromes, and the third with endocrine and neuro-endocrine factors in cardio-vascular syndromes. Each part is fairly exhaustive and for that reason the book will serve as a useful reference volume for clinicians. There is in addition a magnificent bibliography of 3726 references occupying 176 pages, and the value of this to research workers cannot be over-estimated.

It is impossible in a review to discuss Dr. Raab's ideas in detail. The main theme is delightfully illustrated on the frontispiece and, stated briefly, is that various hormones, especially the catechol amines and the adrenal cortical hormones, by their influence on cardiac metabolism play a considerable part in many common cardio-vascular disorders. This is therefore not a book for students but rather for the more mature physician and research worker.

Principles of Intensive Psychotherapy. By Frieda Fromm-Reichmann, M.D.; 1953. London: George Allen and Unwin, Limited. 9" x 6", pp. 264. Price: 18s.

THIS book is a stimulating account of the author's interpretation and application in psychotherapy of the psychoanalytical concepts of Sigmund Freud and the interpersonal conceptions of H. S. Sullivan. The author is uncompromising in her assertion that there is no valid intensive psychotherapy "other than that which is psychoanalytic or psychoanalytically oriented". As a result, the book is not one to be read with ease except by those familiar with psychoanalytic teaching. Much of the material quoted is from her work with psychotics, and the author's approach is obviously the result of her belief that "the first prerequisite for successful psychotherapy is the respect that the psychiatrist must extend to the mental patient . . . realizing that his patient's difficulties in living are not too different from his own". As a result of this belief, the author throughout the book regards the psychotherapeutic process as an interpersonal relationship, with affective influences affecting both patient and psychiatrist, and therefore to be considered in the light of the personality of the therapist as well as of the patient.

The book is divided into three parts. The first deals with the personal and professional requirements of the psychiatrist, and stresses the need for the psychiatrist to be continually on the alert in order to be aware of the real dynamics of his emotional response in the interview situation. The author rightly sums up the basic requirements of a psychiatrist . . . he "must be able to listen". It is rather startling that she should find it necessary to insist that the psychiatrist should not fall asleep whilst listening to his patients.

The second part deals with the psychotherapeutic process on orthodox psychoanalytical lines, and the small third part consists of a potpourri of advice as to the attitude of the psychiatrist toward intercurrent events in the lives of the patient and the therapist. Like most of its kind, the book is dogmatic, and will be read with approval by the psychoanalytically minded—and there is much therein to stimulate and inform the more eclectic.

Diseases of Children. Edited by Alan Moncrieff, C.B.E., M.D., F.R.C.P., and Philip Evans, M.D., M.Sc., F.R.C.P.; Fifth Edition; 1953. London: Edward Arnold and Company. In two volumes. 9" x 6", pp. 1990, with 690 illustrations. Price: £7 the set.

THE purchaser of the fifth edition of Garrod, Batten and Thursfield's "Diseases of Children" can feel that he has at his disposal the best British brains on the subject. It is now forty years since the first edition appeared and the original editors have long since handed on their task. The two volumes of the fifth edition are the combined achievement of 50 contributors, the list of whose names reads like a paediatric "Who's Who". It includes the occupants of six chairs of Child Health at English and Scottish universities, several of the senior staff of the Hospital for Sick Children Great Ormond Street, and most of the best-known teachers in London and the provinces. Included also are contributions from an anaesthetist, a dental surgeon, a venereologist, a psychologist, an orthopaedist and a number of paediatric surgeons, for the subject is as wide as the practice of medicine and the authors have aimed at presenting all that is relevant about the sick child. Several chapters are the work of men who have already published books on their

subjects—for example, Evans and McKeith on infant feeding, Illingworth on child growth and development, Whitby on diseases of the blood.

At the present time paediatrics is the most rapidly growing of all the specialties. Advances in diagnosis and treatment and the research work of several new university departments of child health throughout Great Britain have made many alterations necessary in the fifth edition. There are completely new sections on causes of congenital malformations, child growth and development and on drug treatment as well as on endocrine disorders, congenital heart disease and infant feeding.

When almost every contributor is an authority on his subject the reader would be hard to please who was not satisfied with the material presented, which is of high standard throughout. There has been some overlapping, several diseases being described in two places from different points of view, which does not matter at all. The space allotted to some conditions does not correspond to their clinical importance. Tetanus, bed-wetting, and pink disease secure only two pages each, ascaris one page, and congenital obliteration of the bile ducts a few lines, and one feels they have been shabbily treated when 17 pages are devoted to encephalography and ventriculography, 13 to electroencephalography and nine to smallpox. A chapter on common poisonings with such substances as kerosene, lead, atropine and salicylates should certainly have been included. With the exception of lead encephalopathy these are not mentioned. Another surprise is the omission of the gluten story in celiac disease, one of the most exciting paediatric discoveries of the decade. Most people will take exception to the statement on page 332 that "the results of using pancreatin have not been impressive" (in congenital cystic fibrosis of the pancreas) when they are in fact dramatic.

These are but small criticisms set against the immense solid worth of the two books, easily the outstanding British work on paediatrics. It should be popular not only for reference in medical libraries, but also with all practitioners having to deal with sick children who are cut off from consultant aid. Each of the two volumes contains about 1000 pages, with continuous page numbers and a single index. They are well printed, easy to read, not too heavy to be held comfortably in the hand, and illustrated by almost 700 good photographs. Those on pages 85 to 90 depicting the development of the baby are splendid.

The Radiology of Bones and Joints: An Introduction to the Study of Tumours and Other Diseases of Bone. By James F. Brailsford, M.D., Ph.D., F.R.C.P., F.I.C.S. (Hon.); Fifth Edition; 1953. London: J. and A. Churchill, Limited. 10" x 7 1/2", pp. 890, with 600 illustrations. Price: 90s.

THIS is a complete revision of the fourth edition published in 1948, with much added information gained from the follow-up of patients over the years and a selection of cases reported in various publications recently. Two hundred new illustrations have been added and several old ones discarded for plates which show the conditions more clearly. The work is divided into two main parts. Part I deals with regional radiography and covers the normal appearances and many of the abnormalities of these regions, and Part II deals with abnormalities and pathology of the bones and joints. The quality of the illustrations throughout this work is of the highest order and the various captions describe the particular plate in clear language. In discussing the skeleton at birth, the author gives a new sign of fetal death, namely, a collection of air within the cranium. A good table of ossification times of the fetal skeleton is given. It is surprising that in this and previous editions the author has not included a good description of the supernumerary ossicles of the carpus; he refers the reader to Köhler's work, yet in the case of the supernumerary ossicles of the foot a detailed table of these ossicles is given. In Part II the work is most helpful in the discussion of the differential diagnosis of those dozens of complicated diseases which are so difficult to distinguish from one another.

This work, which is generally recognized as that of the greatest British authority on bone conditions, is a "must" in every radiologist's library.

Diseases of Muscle: A Study in Pathology. By Raymond D. Adams, M.A., M.D., D. Denny-Brown, M.D., D.Phil., F.R.C.P., and Carl M. Pearson, M.D.; 1953. New York: Paul B. Hoeber, Incorporated. 9 1/2" x 6 1/2", pp. 572, with 347 illustrations. Price: \$16.00.

THIS monograph is based on the experience of the authors in the neurological unit and the Mallory Institute of Pathology of the Boston City Hospital. It is printed through-

out on art paper and the reproductions of the photomicrographs are superb. Some of the finer points of anatomy of muscle are illustrated by colour reproductions and by photographs of preparations viewed by polarising and electron microscopes.

There are three main sections. The first deals with the nature of skeletal muscle under the headings of anatomy, histology, innervation and blood supply. The chemistry and physiology of muscular contraction are briefly dealt with in a manner which is a masterpiece of lucid writing. This is the more remarkable when one considers the many obscure papers contributed to the literature of this highly technical subject. The second section covers the pathological reactions of skeletal muscle. Here both experimental pathology and disease reactions are fully discussed. In the third section the pathology of muscle diseases includes sections on muscular dystrophies, and spinal and neural muscular atrophies, as well as tumours, injuries and inflammation.

Of special interest is a section on the practical aspects of obtaining and preparing muscle tissue for microscopic study, with a discussion of common artefacts in microscopic sections of muscle. It is stated that "the common artefacts can be recognised only after some experience with biopsy material. Hyalinization, granular change and fibrillar splitting can all be produced by fixation". Suggestions are made to assist the pathologist in avoiding these pitfalls.

Throughout the book comprehensive lists of references are given. Much of the work, however, is derived from the personal observations of the authors, including much hitherto unpublished material. The result is a comprehensive survey of the accumulated knowledge of muscular disease which is unique in its scope. Both as a text for neurologists and others particularly interested in the field of muscular disease, and as a reference for practitioners of less specialized interest, this book will attract wide interest.

Extrasystoles and Allied Arrhythmias. By David Scherf, M.D., F.A.C.P., and Adolf Schott, M.D. (Heidelberg), M.R.C.S.; 1953. London: William Heinemann (Medical Books), Limited. 10" x 7", pp. 546, with 212 illustrations. Price: £5 5s.

In this book Scherf and Schott have filled 531 pages, which might at first sight appear excessive, but as they have included experimental observations as well as clinical investigation in their researches the volume could not profitably be abbreviated. Perhaps their work could be said to be based on their conception of a difference between true extrasystoles and automatic beats. They appear to have established that the former are precipitated by the preceding beat, that they originate in a circumscribed focus and that they are not due to reentry.

They introduce their subject with an interesting and comprehensive account of its history. Acknowledgement of the stimulus and help given them by Wenckebach and Rothberger is gratefully recorded.

They have endeavoured to link up the various arrhythmias by searching for underlying mechanisms. This naturally includes work on fibrillation and flutter, wherein they appear to have priority over Prinzmetal in the anti-circus movement field.

Their clinical acumen is not overshadowed by their scientific researches, for they have arrived at conclusions concerning the prognostic importance of various types. Their exposition of the many variables has shown that very careful consideration has to be undertaken before an accurate interpretation of the electrocardiogram can be made. This, of course, is essential for prognostic accuracy.

However, they have established certain general rules regarding the significance of extrasystoles which coincide fairly well with clinical impressions. "Multifocal" extrasystoles have often been viewed with some degree of concern. With this the authors are in accord, but they point out that "multiform" is a more accurate term than "multifocal".

Due consideration is given to the effects of drugs and electrolytes, the point being made that extrasystoles due to digitalis imply myocardial damage.

Chapter XI is an important one dealing with mainly clinical aspects of extrasystoles and ectopic beats generally. This includes the effects of exercise, posture, varying types of heart disease, surgical and medical treatment and investigation, allergy, glandular derangement *et cetera*. It is a fitting summary.

The text is both comprehensive and particular, for the authors' own views are clearly expressed. It is supported by a tremendous bibliography so that for the student and the research worker this book will prove of great value. For the clinician it can be confidently recommended as being an excellent reference book as well as a guide in practical problems.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Les Toxicomanies", by Antoine Porot; 1953. Paris: Presses Universitaires de France. 7" x 5", pp. 186.

This book is entirely in French. It deals with drug addiction in general and its control and considers the several drugs of addiction individually.

"L'Age Critique", by Paul Guilly; 1953. Paris: Presses Universitaires de France. 7" x 5", pp. 130.

This book is entirely in French. It deals with the female and male menopause.

"Basic Bacteriology: Its Biological and Chemical Background", by Carl Lamanna, Ph.D., and M. Frank Mallette, Ph.D.; 1953. Baltimore: The Williams and Wilkins Company. London: Baillière, Tindall and Cox. Sydney: Angus and Robertson, Limited. 9" x 6", pp. 692, with 100 text figures. Price: £5 7s. 6d.

The book is intended to present the nature of the cytological, morphological, taxonomic, physiological and biochemical problems which confront the bacteriologist.

"Diuretic Therapy: The Pharmacology of Diuretic Agents and the Clinical Management of the Edematous Patient", by Alfred Vogl, M.D.; 1953. Baltimore: The Williams and Wilkins Company. London: Baillière, Tindall and Cox. Sydney: Angus and Robertson, Limited. 9" x 6", pp. 262, with five text figures. Price: 53s. 9d.

The author discusses the pathogenesis of the different types of edema and the action of the various drugs and therapeutic procedures which can be employed.

"Operative Surgery", by Guy W. Horsley, B.S., M.D., F.A.C.S., and Isaac A. Bigger, M.D., F.A.C.S.; Sixth Edition; 1953. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical), Limited. In two volumes. 10" x 7", pp. 1610, with 1274 illustrations. Price: £15 15s.

The last edition was published in 1940.

"Symptoms of Visceral Disease: A Study of the Vegetative Nervous System in its Relationship to Clinical Medicine", by Francis Marion Pottenger, A.M., M.D., L.L.D., M.A.C.P.; Seventh Edition; 1953. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical), Limited. 9" x 6", pp. 446, with 87 text figures. Price: £3 18s. 9d.

A study of visceral disease not from the standpoint of the disease process, but from the no less important standpoint of the patient who has the disease.

"A History of Psychoanalysis in America", by C. P. Oberndorf, M.D.; 1953. New York: Grune and Stratton. 8" x 5", pp. 288, with two illustrations. Price: \$5.00.

The author has been associated with the practice of psychoanalysis since its first introduction into America.

"Manual of Psychological Medicine: For Practitioners and Students", by A. F. Tredgold, M.D., F.R.C.P., F.R.S.E., and R. F. Tredgold, M.A., M.D., D.P.M.; Third Edition; 1953. London: Baillière, Tindall and Cox. 9" x 6", pp. 340. Price: 25s.

Intended to be "a useful and readable handbook to introduce psychiatry to general practitioners and students". Completely revised.

"Dukes' Bacteria in Relation to Nursing", revised by Stanley Marshall, M.D., B.S. (London), M.R.C.S.; Second Edition; 1953. London: H. K. Lewis and Company, Limited. 8" x 6", pp. 214, with 18 illustrations, 12 in colour. Price: 17s. 6d.

Thoroughly revised. The first edition was published in 1946.

"First Aid Made Easy: For the Parent; The Housewife; The Man in the Street and for Everywhere", by William H. London; 1953. Sydney: Dymock's Book Arcade. 7" x 4", pp. 80. Price: 3s.

The title is self-explanatory.

The Medical Journal of Australia

SATURDAY, JANUARY 16, 1954.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

SIR HENRY NEWLAND'S EIGHTIETH BIRTHDAY.

ON November 24, 1953, Sir Henry Newland celebrated his eightieth birthday. The occasion was one of rejoicing among members of the South Australian Branch of the British Medical Association, with whose destinies he has been largely concerned since the early years of this century. Members of the other Branches of the Association in Australia knew Sir Henry for many years as President of the Federal Council and will recall his spirited leadership in the days when the freedom of the medical profession was threatened by governmental action. Sir Henry Newland became a member of the Federal Committee of the British Medical Association in Australia in the year 1921; in 1930 he became its President. When the Federal Committee changed its name and became the Federal Council in 1933, Sir Henry Newland became its first President. When he retired from the presidency of the Federal Council in March, 1949, his services to the Association were the subject of comment in these columns. Attention was then drawn to the great demands that are made on the President of such a large organization. The work of a medical president was stated to be something like the task of a master mariner. It was pointed out, however, that the difference lay chiefly in the fact that the medical president was often expected to have powers of divination. The captain of a ship always had accurate charts of the seas he was sailing; he also had modern pieces of apparatus to give him depth soundings, he had wireless and other devices not suspected by the long-shoreman—in fact, some people would say that he would be clever if he managed to pile up his ship on the rocks in the face of all his safeguards. It was then stated that

the medical president had no accurate charts for currents, rocks and sandbanks. Some of the hazards which he had to meet were built up of the prejudices and purblindness of those around him, and appeared in unexpected places. Sometimes opportunism of some immediate passing benefit waited just ahead, like a Lorelei wielding her golden comb, and the medical ship of State would be damaged, if not wrecked, unless the captain had a sure eye and a single purpose. We remember that Sir Henry Newland, as President of the Federal Council, had this sure eye and single purpose.

On November 24 the South Australian Branch gave Sir Henry Newland a dinner. It was a remarkable occasion, and the refectory at the University of Adelaide was filled to the doors. The President, Dr. J. Sholto Douglas, occupied the chair. The two visitors from other States were Dr. J. G. Hunter, General Secretary of the Federal Council, and the Editor of THE MEDICAL JOURNAL OF AUSTRALIA. The toast of Sir Henry Newland was proposed by Dr. C. O. F. Rieger and supported by the Editor. Dr. J. G. Hunter also spoke. Sir Henry Newland made a happy and characteristic reply. The occasion left no doubt about the esteem, honour and affection in which Sir Henry Newland is held. One of the speakers at the dinner described him as the Churchill of Australian medicine, and as such he may well be regarded.

This journal owes a great deal to the wisdom and the guiding hand of Sir Henry Newland. All connected with it take pride in the fact that he is still the chairman of the Australasian Medical Publishing Company, Limited, which controls the journal. That he will long continue to enjoy health and the tireless energy which is so characteristic of him is the earnest wish of all who are associated with him.

CREATIVENESS IN MEDICINE.

AT many medical schools throughout the English-speaking world, students at the graduation ceremony are addressed by a senior member of the profession on their future prospects, and this graduation address is, as a rule, replete with advice which, if followed, should lead the graduands in the right direction. Sometimes these addresses are published and they are useful because they remind older graduates of the obligations which they assumed at graduation. One of the latest such addresses was given by Alan Gregg at the University of Texas Medical Branch, Galveston, U.S.A., on June 5, 1953.¹ Gregg began his remarks by pointing out to the graduands that change in their ways from those of students was possible because of the possession of what Pavlov called the conditioned reflex. He described this as a magnificently heartening phenomenon which offered to all medical graduates escape from the life of a foreordained automaton, from habits that deadened, tastes that cloyed, and routine that had gone stale, jejune and tiresome. Some people may question why a change in attitude is necessary. They will state that surely a student who has been studying disease in hospital wards and so on, has merely to con-

¹ *Texas Rep. Biol. & Med.*, Volume II, Number 3.

tinue in the way in which he has been going, and that all things needful will, in time, be added to him. Nothing, of course, could be further from the truth. The student, up till the time of graduation, has been taught by university teachers and hospital lecturers, and he has studied patients in hospital beds and in out-patient departments. When he goes into the world of practice, he has to come into contact with men and women in their everyday activities; in other words, he has to put on one side an academic outlook and attune himself to the social aspects of medical practice and make it fit in, as a dovetail fits in carpentry, with what he has learned as an undergraduate student. Gregg went on to remark that so complex and unique was every one of those whom he was addressing, that he could not expect that any one system of education or any one set of experiences could have either stimulated or satisfied all their potential capacities or latent desires. As a result, they were ready to begin new quests—they were prepared for a commencement. It was probably true, he said, that their experience and habit had already determined what they would make out of the next fifty years. That could be so, but at the same time, there remained the exciting chance that they could change, the chance that taste and desires that had never been quickened or satisfied, could in the future appear for the first time, increase, and finally find their consummation. It was for this reason that he spoke to them about creativeness in medicine.

Gregg thought that creativeness had many aspects, but he mentioned in particular two of them. One was the forerunner of creativeness, which seemed to be the perception of relationships not at first apparent, and then, almost in a flash, came the more active phase, the artist's drive to put these freshly perceived relationships into a new arrangement. It was the perception of relationships and a desire to rearrange or reformulate them that was the cardinal element in the creativeness of medical research. He thought that in clinical work lay exactly the same opportunity. Another feature about creativeness was that it was free—that it could find new fields in which to play. He referred in particular to three possibilities of creativeness in medicine. First of all, they could bring creativeness to teaching; secondly, they could bring it to arranging for the care of the sick, and lastly, they could bring creativeness to themselves to create their future selves, to convert themselves from being mere M.D.'s into being real doctors. It is to the last-mentioned of these that we wish particularly to refer. Let us quote Gregg's words:

Each one of you, by heredity, by experience, by education, presents, like the patients you will be responsible for, an absolutely unique combination of a myriad of traits and abilities and tastes. All anyone could offer to your particular and variant characters will be, in essence, the raw material from which you will choose what to take in and to transmute in the individual task of creating yourself. Your future is bound to be a state of becoming, not being. When becoming stops, you are dead.

If a medical man, or any other man for that matter, wishes to create something of himself unlike what he was before, it is only reasonable to suggest that he should have some aim before him. In order to do this, he must have a philosophy of life which will stand up to the strain of everyday existence and which will help him to give to his patients what they need. This means that his own character has to be built. The building of character is a

continuous process. It starts in childhood and it continues throughout the student days up till the end of life. Someone has said that man is not what he thinks he is, but that what he thinks, that he is. This building of character requires constant watchfulness, constant care, and constant what we may call mental eliminative surgery. Attitudes and habits which are not conducive to what we may call the good life must be cast aside. The poet has said that he wished some power would give us the gift to see ourselves as others see us. This is not sufficient, because others cannot see us as we really are. What we have to try to do is to see ourselves as we are and to be honest with ourselves. We should make no mistake whatever about the fact that our ability to bring the best to our patients depends in no small measure upon our own characters. Gregg states that the chief hindrance to creativeness is the lack of convictions big enough and deep enough to give a lasting pattern to professional life. He thinks that the future should not be planned like a pontoon bridge, each petty span being no longer than its predecessor. He advises a decision upon fewer arches and larger ones. He changes his metaphor and adds "keep in mind a symphony; don't be tied to the tiresome reiterations of a popular tune". If we are to have success in this matter of self-examination, we shall do well to study the lives of the great men in medicine who have gone before, and not only men in medicine, but those in other avenues of life. In the long run, the whole question boils down to one of motive. We should each of us ask ourselves what are our motives in practising medicine at all. If our motives are purely selfish, then it would be much better for us if we had never entered a medical school. This statement does not mean that there should be a complete abnegation of self. The practice of medicine is something like the campaign of an army. A well-known British commander in the last war was in the habit of telling his officers that when they were going out on the following day they had to attain a certain objective. This he set clearly before them in detail. He explained that no matter what success they might have on the way towards the attainment of their objective, no matter how many enemies were destroyed, no matter how many guns were captured, and no matter how many additional posts were occupied, if the original objective was not obtained, the whole operation was to be branded as a failure. In medicine, we set out to bring healing to those who are afflicted, to put them in the way of continuing to live a useful life, and to prevent others from becoming ill. If we fail in this, our duty to the patient, it does not matter what else we do, our whole operation in medicine will be a failure. In a recent address on the privileges of a learned profession, Sir Francis Fraser¹ referred to Goodhart's view of the doctor's privilege. Goodhart pointed out that a man who had had a university training was expected to have clarity and honesty of thought and also intellectual curiosity. We may add these two *desiderata* to what has been written about the building of our own characters and our own self-examination. If we have clarity and honesty of thought, we shall not deceive ourselves, and if we have intellectual curiosity we shall have no time to loiter by the wayside and to busy ourselves with affairs of no real importance.

¹ J. Roy. Army M. Corps, October, 1953.

Current Comment.

FURTHER STUDIES OF MULTIPLE MYELOMA.

THOUGH multiple myeloma, like other proliferative diseases affecting the bone marrow, is one of the conditions we cannot cure, the outlook is now rather better in regard to relief from pain. A series of 51 cases was recently surveyed by G. C. Meacham and made the subject of "Current Comment" in these pages.¹ This traversed the symptoms, the changes in the blood and the bone marrow, the curious biochemical features and the abnormal changes in bone. To this may be added the monograph of I. Snapper, Louis B. Turner and Howard L. Moscovitz,² which in some 150 pages of a clear and very well-produced book presents a comprehensive study of 97 cases of multiple myeloma, 41 of which have come to autopsy. The account is well balanced and presents the histo-pathological picture, which, as pointed out in Meacham's article, is variable—the changes in the blood and the marrow, the occasionally deceptive radiographic appearance, the metabolic abnormalities, the differential diagnosis, and the clinical picture. Finally, a helpful section on treatment contains sufficient detail to be of assistance to physicians who have the responsibility of ordering therapy which may at times give rise to most uncomfortable sequels. The authors think that the myeloma cells are derived from the reticulum cells of the bone marrow, and point out that the diagnostic value of marrow puncture is enhanced by the usually even diffuse distribution of these cells. The writers discuss the hypothesis that the disease is a so-called aleucæmic phase of plasma cell leucæmia, but do not commit themselves. Perhaps they feel that the exact name matters little.

Bone pain, one of the most striking clinical features, unfortunately often present, is fully described in relation to the lesions with which it is associated. Snapper and his colleagues draw attention to the frequency of pathological fracture, observed in 59 of their 97 patients, but the diagnostic pitfalls are also stressed. A "characteristic" radiographic picture may be imitated by other conditions.

The involvement of the kidneys is an interesting feature. The authors remind us that the peculiar Bence Jones protein has a low molecular weight and can pass through the glomeruli and precipitate giant casts in the tubules. This blockade they consider a main cause of the renal failure, though resorption of the protein globules may also occur in the tubules. They cite as the three most striking chemical metabolic changes Bence Jones proteinuria, hyper-globulinæmia and paramyeloidosis. The last-named causes deposits of amyloid in unusual places, such as heart muscle, joint capsules or the lungs, most of which are different from those selected by the amyloid deposits familiar in chronic suppuration. These curious findings illustrate how difficult such an illness or even a death may be to explain unless certain diagnostic features are found and recognized. Notwithstanding these less usual manifestations, the diagnosis of multiple myeloma is usually easy. Snapper, Turner and Moscovitz remark that "when bone pain is absent diagnosis is usually difficult". Treatment is, of course, still very unsatisfactory. Diamidinostilbene (stilbamidine), familiar in tropical medicine as a valuable drug in the treatment of kala azar, has been in use for several years, but though this and its apparently less toxic relation pentamidine may relieve symptoms, the metabolic changes characteristic of the disease are unchanged, as is the essential nature of the condition, including its power to kill. Urethane, which has been previously reviewed in these columns as a treatment for myelomatosis, has the advantage of being absorbed when given by mouth, and though irregular and often disappointing in action, may give remarkable relief from pain. The writers point out that irradiation may be similarly unaccountable, for it may relieve pain although the myeloma cell does not seem to

be very sensitive to its influence. Radioactive phosphorus the authors class as disappointing; it may even do harm. Stilbamidine may also do some harm and may cause a disconcerting and most disagreeable form of trigeminal paresthesia. There seems no doubt that modern therapeutics deals with sharply edged weapons, but in an incurable disease all reasonable means are worth while if even temporary relief from pain may be given. Perhaps the readers of this interesting monograph may feel that there is more hope in the apparently academic aspects of research in this disease. Cortisone and ACTH may reduce two of the metabolic abnormalities, hyperglobulinæmia and proteinuria, and it is suggested that the Bence Jones protein and the abnormal globulins are synthesized by the myeloma cells. We are reminded by the authors that in 1848 Henry Bence Jones investigated the curious protein which still bears his name. It would be strange if some day further biochemical study on this substance should be the key to additions to knowledge, for it is an unusual feature which everyone can remember but no one can fully understand.

DIABETES TODAY.

WHEN von Mering and Minkowski in 1889 produced diabetes in dogs by extirpation of the pancreas one would think the way had been made clear for the preparation of insulin. But the clinician and the morbid anatomist of the time opposed any suggestion that the pancreas was involved in human diabetes; this was just another instance of "the lore of the physiological laboratory" being introduced into practical medicine; and so it was that insulin was given to the world by Banting and Best in 1921. The early optimistic hopes that human diabetes had been fully conquered have not been fulfilled. True, an immense improvement in prognosis and treatment has been made. Time was when the physician had the unhappy duty of pronouncing early sentence of death in juvenile diabetes; now the date of demise has been liberally postponed; but the factors operating in spontaneous diabetes are more complicated than was originally imagined. Diabetes following extirpation of the pancreas can be completely cured by small doses of insulin, whereas in the spontaneous type as seen in medical practice much larger doses of insulin are necessary to give betterment and the cure is far from complete. One now realizes that spontaneous diabetes is caused by a faulty endocrine coordination in which the pancreatic islands play an important but by no means a solitary part. Pituitary, thyroid and possibly other endocrine organs are involved, and it is precisely this complication which makes treatment so difficult and often so disappointing. Again, there is evidence that the pancreatic islands contain two different types of cells, the α and the β , and it is highly probable that each has a separate function. Nevertheless a great change has come over the clinical picture of diabetes arising from the discovery of insulin; indeed it may be said that a quite new chapter has been presented. Nowadays, thanks to insulin and regulated diet, the diabetic patient lives longer, but in this welcome lease of life new dangers have unexpectedly arisen. It is now recognized that all forms of diabetes, experimental and human, lead to degenerative changes; the juvenile diabetic who has been reprieved from early death becomes a victim of cardio-vascular-renal disease causing invalidity and blindness and an earlier death than was expected. It is precisely this problem which has been examined by Dr. Sverre Aarseth in Oslo during the years 1948 to 1951, and the results have been published in a special supplement of the *Acta medica Scandinavica*.¹

Dr. Aarseth did not confine his efforts to statistics derived from hospital records; he subjected 312 diabetics to a searching and personally directed examination. The voluminous findings constitute an important addition to diabetic literature and should be read in detail by those interested. Amongst the more important conclusions

¹ M. J. AUSTRALIA, November 28, 1953.

² "Multiple Myeloma", by I. Snapper, M.D., Louis B. Turner, M.D., and Howard L. Moscovitz, M.D.; 1953. New York: Grune and Stratton, Incorporated. 9" x 6". pp. 176, with 48 illustrations. Price: \$6.75.

¹ "Cardiovascular-Renal Disease in Diabetes Mellitus: A Clinical Study", 1953, *Acta med. Scandinav.*, Supplement 281, accompanying Volume 146.

reached the following may be mentioned. "The predominant cardiac disease in diabetes is coronary sclerosis with or without infarct of the heart." "Diabetic cataract mostly occurs in juvenile diabetics with poorly regulated diabetes." "Correlation between hypertension and adipositas was observed in the females but not in the males." "Roentgenologic demonstrable arteriosclerosis in the arteries of the legs and pelvis was found in 55% of those examined." "One-fourth had persistent proteinuria." "Infection of the urinary tract was common."

The reader will probably have his personal convictions upheld that diabetes lowers resistance to infection and enhances any tendency towards degenerative change. The longer the diabetic condition lasts, the more serious are the pathological conditions found.

3-D ELECTROCARDIOGRAPHY.

THE battle over the validity of Einthoven's original view that the frontal projection of the electrical axis could be calculated from the three-limb leads has waged hotly ever since it was first postulated. L. Katz in his text-book emphasized the error in assuming the heart to be in the centre of a uniform conductor with the limb leads equidistant from it, and for this and other reasons denied the possibility of analysis on a geometric principle of cardiac currents. This view has been seriously challenged and modern work generally refutes it, for although it is acknowledged that the heart is not in the centre of the chest electrically, F. N. Wilson et alii have stated that leads taken more than 12 centimetres away from the heart mass are considered equidistant owing to the rate of drop-off of potential difference beyond this distance.¹ The possibility that the chest is a uniform conductor was denied by Katz. However, as was shown by F. Johnston and W. Kaufman, it is now so regarded for all practical purposes.²

With this hypothesis established many workers felt that frontal plane electrocardiography, expanded as it was from three leads to twelve leads by the advent of the unipolar technique, was still leaving cardiography an empirical study requiring memorization of patterns and leaving many problems unsolved. In an attempt to make electrocardiography a more exact science many workers have studied the instant-to-instant track of the cardiac vector in three-dimensional space. This is called vectorcardiography and requires additional electrodes to those in the frontal plane. The vectors have been visualized on oscilloscope screens in any one of three selected planes, and wire model loops have been constructed to show the normal patterns. However, vectorcardiography has severe limitations and, as shown by D. Bikes,³ in some cases fails to reveal changes seen in the normal electrocardiogram.

In an attempt to eliminate "blind spots" in the cardiogram, that is, lesions which do not show on the routine tracings, use has been made of the additional electrodes outside of the frontal plane. Duchosal and Sulzer chose four sites for their electrodes which when joined together formed a cube system with three leads, A, B and C. R. Grant⁴ chose one lead behind the heart coupled with the three limb leads, whereas Wilson and Johnson used a tetrahedral system. Urschel and Abbey improved on Grant's system of a three-sided pyramid.

A new entry in this field has been made by E. R. Trethewie, of Melbourne, who has proposed a new set of chest positions in a simplified scheme after the manner of Duchosal and Sulzer, but differing from them in his electrode placements.⁵ He takes as four points on the chest wall the middle of the manubrium sterni, the xiphisternum, the middle of the left axilla and on the horizontal plane of the xiphisternum, and a point on the right posterior chest wall. This point lies at right angles to the xiph-

sternal-axillary line. This gives three planes at right angles with the xiphisternum as a focal point, and from these points he couples the electrodes to give three leads, A, B and C. So much is simple. However, the interpretation of the resulting patterns appears to be largely empirical, based on reference to limited autopsy confirmation and a frozen section of the heart *in situ*. If this method will help us, as the author claims it will, in such difficult problems as the diagnosis of posterior infarction when the pain and the Q3-T3 patterns are atypical, there will indeed be a place for this method.

Whether or not this newer technique will find favour will depend on a clearer exposition of its fundamentals and on further experience, as most unmathematically minded physicians are just pausing for breath after digesting unipolar electrocardiography; fresh onslaughts from the "back room" boys will be stoutly resisted until they can prove their claims to the hilt.

DISPOSAL OF TUBERCULOUS SPUTUM IN THE HOME.

A PROMISING method has just been described for the disposal of tuberculous sputum in the home.⁶ The agent used is a hypochlorite solution containing caustic soda, which is marketed under the name of "Milsol". A laboratory investigation carried out at the bacteriology department of the Brompton Hospital, London, is described by F. J. Baker. It appears that sputum is dissolved in fifteen to thirty seconds when added to the "Milsol" solution, and this quality suggested that it might prove a suitable means of disposal of sputum, especially for patients in their own homes. The laboratory investigation indicated that "Milsol" was rapidly lethal for *Mycobacterium tuberculosis*, and prolonged contact with sputum did not significantly reduce its bactericidal properties for that organism. Following this demonstration that the bactericidal and homogenizing actions of "Milsol" were effective under laboratory conditions, Peter Stradling carried out a field trial. Altogether 41 separate investigations were undertaken in the homes of 25 patients producing adequate quantities of sputum. The patients were instructed to place one to three ounces of "Milsol" in their sputum container, a one-pound jam jar being particularly suitable, and after each expectoration to rotate the container so that the "Milsol" washed the sides, keeping them clean and free from sputum particles. At the end of twenty-four hours, and before disposal, the container was to be left for one hour after the last amount of sputum had been added. The container was then to be rotated and the contents emptied "down the lavatory". After being washed in a solution of "Milsol" and having further "Milsol" added, the container could be returned to use. The patients were provided with "Milsol", instructed in its use and asked to keep a twenty-four hour specimen for collection. In addition they were to provide one specimen of untreated sputum for control. The results, which need not be quoted in detail, proved particularly satisfactory. It is true that cultures of *M. tuberculosis* were grown from two "Milsol" samples, but Stradling states that the patients concerned had very copious sputum and had not added extra "Milsol" to ensure a clear residual fluid as they had been instructed. He has little doubt that the results would also have been negative in their cases had they followed the instructions more carefully. The method certainly sounds attractive.

As Stradling points out, non-homogenizing disinfectants are bacteriologically unsatisfactory in sputum mugs, because unchanged sputum particles can contain living bacilli even though they have been in contact with a disinfecting agent for many hours. Adequate cleaning and sterilization of the sputum mug thus entailed daily treatment with soda and subsequent boiling. All this is eliminated, with, if anything, greater bacteriological efficiency and a procedure that is much more acceptable aesthetically. Stradling states that most patients as well as those relations who were

¹ Am. Heart J., 1934, 9: 447.

² Am. Heart J., 1943, 26: 42.

³ Am. Heart J., 1953 (August).

⁴ Am. Heart J., 1950, 39: 17.

⁵ Trethewie, E. R. (1953), "Simplified Electrocardiography".

⁶ Lancet, December 5, 1953.

acting as nurses in the home were enthusiastic about the method; the repulsive duty of disposal and cleansing of the receptacles had been superseded by a simple, rapid and safe process. Minor difficulties were noted. Some patients objected to the smell, and one found that his asthma was aggravated. In addition, the "Milsol" will bleach carpets and bedclothes if it is spilt. However, it would seem, as Stradling states, that "Milsol" represents a great advance on the non-homogenizing antiseptic fluids commonly used in sputum containers, and at the same time is no more poisonous. It might with advantage take the place of these, not only in the home, but also in hospitals where a sputum mug method of disposal is used, since there would then be less risk of infecting the nurses. It would appear also to have advantages, particularly in the home, over other methods of disposal, such as the use of paper handkerchiefs, which are expensive, are inadequate when there is copious sputum, and need a fire for their disposal.

CHLORAMPHENICOL IN THE GUT.

THE treatment of typhoid fever with chloramphenicol ("Chloromycetin") has changed the clinical course of typhoid fever profoundly, but some concern is being felt about the high relapse rate and the persistence of *Salmonella typhi* in the stools of many treated subjects. There appears to be a difference between the effect of chloramphenicol on *S. typhi* in tissue and its effect on the same organism in the bowel. J. D. Gray¹ suggests that this may be due to a lower concentration of the drug in the gut than in the tissues. He describes a series of experiments showing the amount of active antibiotic in the stool when various dosages are given. In one patient admitted with acute cholecystitis, for which the gall-bladder was drained, the excretion of chloramphenicol in the bile was determined. The other patients taking part in these investigations were not suffering from typhoid fever; but Gray assumes that the evidence afforded by a study of the coliform bacilli in his experiments can be applied to salmonellae, as both organisms are susceptible to "Chloromycetin". On the basis of his observations, an explanation is provided for "relapses" and for persistent excretion of typhoid bacilli in many treated cases. Chloramphenicol concentrations must be estimated biologically, and for this purpose a culture of "El Tor" vibrio was used. The resistance of *S. typhi* to the antibiotic varies between 0.5 and 4.0 microgrammes per ml with an average of 2.5 microgrammes per ml. Gray's experiments showed that a patient given 30 to 40 milligrammes of antibiotic per kilogram of body weight per day will produce a drug concentration of about 1.5 microgrammes per gramme of wet stool, provided the liver and gall-bladder function effectively. This amount is slightly less than that required to destroy pathogenic organisms of average sensitivity swarming in the gut; at the same time the dosage produces tissue and bile levels high enough to deal with the invaders. Continuance of treatment with the antibiotic thus sustains tissue protection, but Gray reasons that if the administration is stopped before body defence mechanisms have had time to elaborate antibodies, reinfection occurs, producing the so-called relapse. His experiments showed that if the dosage was raised to 75 milligrammes per kilogram per day, the concentration in the bowel would be in the region of four to six microgrammes per gramme of wet stool, slightly in excess of the amount required to kill the pathogens. In theory this amount of antibiotic would have to be maintained for about seven days; previous experiments by Gray have shown that 99% of a proliferating bacterial population are killed within a day at ordinary therapeutic concentrations, but the remaining 1% persist in diminishing numbers for five to seven days. The speed of bacterial death induced by this antibiotic apparently depends on metabolic activity—the greater the bacterial metabolic rate the more rapid the death and vice versa. The period of five to seven days would be adequate only if there was no increase in bacterial resistance; if Gray's experience with

coliforms can be applied to salmonellae, a rise of three to five microgrammes in the resistance of some strains can be expected. This problem is not solved by increased dosage, for it has been shown that the maximum stool concentration is reached on an intake of 75 milligrammes per kilogram of body weight per day. The difficulty—indeed, the crux of the whole matter—lies in the almost complete absorption of antibiotic from the alimentary tract. This is an excellent property of chloramphenicol from the point of view of its action in the tissues, but not such a good thing from the point of view of its action in the bowel. In these treated patients it is the bowel, not the gall-bladder, that is likely to harbour typhoid bacilli and give rise to a permanent carrier state.

The whole problem is a difficult one, for agglutination titres in the patient's serum following treatment with chloramphenicol are unpredictable; the rapid death of the bacteria in the tissues, followed by their excretion, means that the prerequisite for antibody production—the stimulus—is lost. The more efficient the treatment, the less immunity is acquired. Gray advocates a daily dosage of 75 milligrammes per kilogram of body weight per day, but he does so with reservations, for a higher incidence of "toxic crises" may follow its use; and also the effect of the antibiotic on the normal flora of the gut must be borne in mind. The administration of antibiotic for long periods to patients with yeasts and a bacterial flora of normal or high sensitivity to chloramphenicol may expose them to moniliasis of the bowel and perianal regions. The occasional adverse effect of chloramphenicol on the blood will, of course, be guarded against by frequent blood counts. Chloramphenicol has provided us with a great advance in the treatment of typhoid, but like all "wonder drugs" it must be used with care and sagacity.

DIARRHCEA FOLLOWING GASTRECTOMY.

DIARRHCEA not uncommonly develops soon after gastrectomy. Usually it is mild and transient, but it may persist for a long time and rarely may be dangerously, even fatally, severe. Its exact cause is obscure. J. W. Howie, I. B. R. Duncan and Lois M. Mackie² report an attempt to discover a bacteriological cause for the diarrhoea by repeated examination of the faeces, but without success. However, impressed by the similarity of the clinical symptoms of post-gastrectomy diarrhoea and of the gastroenteritis caused by food poisoning with heat-resistant *Clostridium welchii*, type A, they made a search for this organism. It was not found in the faeces, but it was numerous during the first week after partial gastrectomy in the stomach contents of 12 of 15 patients examined. Moreover, in eight of the 15 patients filtrates of the stomach contents contained detectable amounts of the toxin of *C. welchii*. It is not wise to jump to any conclusions from these results. Apparently, partial gastrectomy influences events within the alimentary tract in such a way that *C. welchii*, a normal inhabitant, may grow and produce detectable amounts of a toxin within the stomach remnant. The clinical significance of this, if any, in relation to post-gastrectomy diarrhoea and to the old question of the role of *C. welchii* as a human intestinal pathogen remains to be determined. Howie and his colleagues suggest only that the evidence makes a case for examining the position again. It is interesting to note, without assuming any necessary connexion, two other reports accompanying the paper by Howie et alii. A. G. Rutter describes a case of ischaemia necrosis of the stomach following subtotal gastrectomy. M. R. Williams and J. M. Pullan report 10 cases in which a characteristic syndrome (severe diarrhoea with circulatory collapse) developed after gastric surgery. Five patients died, and necropsy showed necrosis of the mucosa of the small bowel. The secret of effective treatment was the correction of dehydration and of protein loss. No real clue to aetiology was forthcoming. It is not clear whether attempts were made to isolate *C. welchii*, either by Rutter or by Williams and Pullan.

Abstracts from Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

Demonstration of Tubercle Bacilli in Milk.

H. WILLIAMS SMITH (*J. Path. & Bact.*, January, 1953) has made a critical study of the technique of demonstration of tubercle bacilli in milk, including a study of the control of contaminants, the effects of chemical methods of preparation on bovine tubercle bacilli, and a comparison of Dubos penicillin agar, guinea-pig inoculation and direct microscopy under field conditions. Good control of contaminants was achieved by 4% sodium hydroxide solution digestion for thirty minutes at 37° C followed by neutralization and suspension of the sediment in bovine albumin plated onto Dubos penicillin agar, but this treatment produced a certain amount of lethal effect on the bacilli. In a comparison of the results from 30 specimens which infected the guinea-pig, tubercle bacilli were grown from 16, and organisms were seen in the direct smear from 10. The author concludes that guinea-pig inoculation is superior to other methods, and he suggests that bovine tubercle bacilli may be more susceptible to the action of chemicals used in the control of contaminants. A number of acid-fast bacilli isolated proved to be non-pathogenic, and the author discusses the importance of this observation in relation to direct microscopy.

Antimycobacterial Activity of Spermine.

JAMES G. HIRSCH (*J. Exper. Med.*, March, 1953) observed the antimycobacterial activity of various amines related to spermine in chemical structure while studying the influence of local biochemical conditions on the fate of tubercle bacilli *in vivo*. He tested the substance itself and many similar compounds, and its degradation products on a strain of B.C.G. grown in standard Tween Dubos medium with added 5% bovine plasma. Readings were taken after ten days' incubation. It was found that spermine and spermidine in a final concentration of 3×10^{-6} M inhibited the growth of the test organisms, but no other substance tested had this activity.

The Protection of Intracellular Brucella.

J. M. SHAFFER, C. J. KUCERA AND W. W. SPINK (*J. Exper. Med.*, January, 1953) studied the protection of intracellular brucella against therapeutic agents and the bactericidal action of serum. Leucocytes were obtained in the peritoneal exudate developed in the white rat after intraperitoneal injection of sodium caseinate. Eight hours later a saline suspension of brucella organisms was injected, and *in-vivo* phagocytosis allowed to proceed for sixteen hours, by which time all the bacilli were inside the cells. The exudate was then harvested, and the leucocytes were washed and resuspended to be used in the testing of antibiotics and anti-septics. A control series was made in which the leucocytes were heated to

60° C. for thirty seconds before washing. Counts of the viable bacilli in the leucocytes were made, before and after treatment with various substances. The survival time of the leucocytes carrying bacteria was almost the same as that of normal leucocytes in the medium used. None of the therapeutic substances was able to kill all intracellular brucella in twenty-four hours, even when it was highly active against the organisms unprotected by the presence of cells.

Spermine Oxidase.

J. G. HIRSCH (*J. Exper. Med.*, March, 1953) investigated the activity of spermine oxidase, an amine oxidase with specificity for spermine and spermidine. Oxygen was consumed and ammonia produced when sheep and bovine sera were mixed with spermine; this did not take place with other sera. The author states that the reaction takes place between pH 6.0 and 8.0. Carbonyl reagents almost completely block the action of the enzyme, while cyanide partially inhibits it. In the presence of mercuric chloride, the serum spermine system consumes twice as much oxygen as its controls. Further investigations are in progress.

Phagocytosed Tubercle Bacilli and Vaccination.

E. SUTER (*J. Exper. Med.*, February, 1953) studied the multiplication of tubercle bacilli within mononuclear phagocytes in tissue cultures derived from normal animals and animals vaccinated with B.C.G. By a technique previously described, suspensions of monocytes were obtained from guinea-pigs and rabbits, mixed with a suspension of tubercle bacilli, and after a period allowed to settle on small glass slides, which were then removed to bottles containing a suitable culture medium, and incubated in a rotating machine; the medium was changed after one and three days. After three, five and seven days a slide was removed and stained, and the number of bacilli engulfed was determined. Monocytes derived from normal and vaccinated animals were used. It was shown that the organisms increased in number in normal monocytes, but not within those derived from vaccinated animals, during the first five days. This phenomenon occurred whether virulent or attenuated bacilli were used. The addition of the animals' own serum to the culture medium or of serum from vaccinated animals did not inhibit multiplication of organisms in normal monocytes. Guinea-pigs vaccinated only eight days previously yielded monocytes which could inhibit bacillary multiplication.

An Antiviral Substance from *Penicillium Funiculosum*.

RICHARD E. SHOPS (*J. Exper. Med.*, May, 1953) has made studies of an antiviral substance from *Penicillium funiculosum*. Three papers are published, the first dealing with the effect upon mice infected with swine influenza virus or Columbia SK encephalomyelitis virus. The fluid used was at first a culture filtrate, which was found to lengthen significantly the survival time of mice inoculated with swine influenza virus. As the experiments progressed, tests were made upon animals infected with SK encephalitis

virus, and here, too, there was a therapeutic effect, although the effect on later animals inoculated with swine influenza diminished. Titrations of virus were carried out on surviving treated mice and dead controls, and it was found that similar amounts of virus were present in treated and untreated mice. An attempt to concentrate the active substance showed that it was precipitable by acetone and probably contained some polysaccharide. Then it was found that much larger amounts of the active principle, named by the author "helenine", could be obtained from the fungal mycelium itself after treatment in a Waring blender.

The second paper describes experiments upon mice inoculated with a highly virulent strain called Semliki Forest virus, which will kill every animal inoculated either subcutaneously or intraperitoneally. Here a larger number of animals survived than in the experiments with SK encephalitis virus, but the reason lies in a quantitative difference rather than a variation in the therapeutic action, general properties and characteristics of helenine. It is moderately stable at refrigerator temperatures and loses its activity slowly at room temperature. It can be filtered but not dialysed from solutions. It is partially inactivated by heating in a boiling water bath for three minutes and destroyed by autoclaving. As the animals which survive infection when treated by helenine die if challenged with a later dose of the same virus, it is suggested that the mechanism of its action may be exerted by rendering the virus non-antigenic, perhaps by interfering with its developmental cycle. The author discusses the possibilities of the meaning of his work and is careful to emphasize that he is working with a crude substance whose chemical nature is unknown, in a small group of diseases which affect the mouse. He refuses to make any suggestions in relation to this or other similarly obtained substances and their effects on viruses pathogenic for man.

Complement Fixation with the Three Types of Poliomyelitis Viruses Propagated in Tissue Culture.

A. SVEDMYR, J. F. ENDERS AND ANN HOLLOWAY (*Am. J. Hyg.*, January, 1953) continued their studies of complement-fixation tests with antigens derived from the three types of poliomyelitis viruses propagated in tissue culture. The viruses were grown in the medium previously described (skin or muscle from embryos grown in hen plasma clot with enrichments) and incubated for ten to thirteen days in roller tubes, the fluid phase of the cultures being changed every three days. The antigens were prepared from pools of the final culture fluid, and anticomplementary activity was eliminated by heating. Lansing strains of virus gave the highest concentration of antigen; Lansing strains consistently yielded the lowest. Sera from monkeys immunized with the homologous strains were used to test the antigens. Sera were obtained from patients with poliomyelitis from whom virus had been isolated (16 Brunhilde, eight Leon-like strains). Tests were also made for the presence of neutralizing antibodies in the serum of these patients. The results show that while complement-fixation tests

may show increase in antibody against more than one type of virus, the neutralization tests show complete correlation with the type of virus found in the patients' feces. The authors suggest that the antigenic constitution of poliomyelitis virus is complex and includes group-specific as well as type-specific antigens. The usefulness of the test as a diagnostic measure therefore has limitations, and tests for neutralizing antibodies by tissue culture techniques will provide more information.

HYGIENE.

Identification of Enteric Pathogens.

R. MACREADY AND M. HOLMES (*Am. J. Pub. Health*, March, 1953) describe a technique for the identification of *Salmonella* pathogens in stools in two or less days. They state that rapid identification of the infecting organism is of value to the epidemiologist in his investigation of the infection and to the physician in his management of the case. The method involves fishing colonies from the primary plates into small lactose-sucrose broth tubes, incubating them for one to three hours in the 37° C. water bath, performing hanging-drop motility and agglutination tests, and inoculating the confirmatory carbohydrates—all on the day of fishing, so that a day is saved over the customary double or triple sugar agar screening technique. Since prompt diagnosis is of real aid to both the clinician and the investigating health officer, and the procedure is reasonably simple for the trained bacteriologist, its use is recommended for laboratories doing diagnostic enteric work. If the so-called microtechniques are employed in the confirmatory as well as the screening tests, enteric pathogens can frequently be identified on the day of the fishing or at the latest on the following morning. This more rapid variation is recommended only when enteric specimens are handled in large numbers by bacteriologists specially experienced in the field.

Reinoculation with Multiple Antigen Preparations.

V. K. VOLK, F. H. TOP AND W. E. BUNNEY (*Am. J. Pub. Health*, July, 1953) report the results of reinoculation with multiple antigen preparations of 251 children who had been inoculated three years previously with similar preparations. The preparation used contained diphtheria toxoid alum-precipitated, tetanus toxoid alum precipitated and pertussis vaccine. The authors found that in regard to diphtheria and tetanus as measured by antitoxin levels, the immune status of children who had received a series of three injections of a multiple antigen preparation containing diphtheria, pertussis and tetanus antigens was of a high order at the end of three years after the first of three injections of the primary series. The immune status of children who had received two injections was less adequate. These findings indicate the desirability of attempting renewal of protection by means of booster doses if reactions are at a minimum and if results following reinoculation prove beneficial. Reactions following a booster dose of a multiple

antigen preparation were greater than those following the first and second injections of the primary series, but not greater than those following the third injection of the primary series. A dose of 0.2 ml resulted in fewer reactions than did a dose of 0.5 ml. A single booster dose of the multiple antigen used in the study could safely be given to previously inoculated children. Booster doses of a multiple antigen preparation resulted in an increase in antitoxin titre against both diphtheria and tetanus two weeks after injection, and the levels found at this time were maintained for at least six months, the last period observed. Within the limits of titrations used, levels were found to be equally high after use of 0.2 or 0.5 ml of the multiple antigen preparation, and the 0.2 ml dose is therefore recommended because fewer reactions follow its use. The response to the pertussis antigen in the preparation followed the pattern noted in diphtheria and tetanus. The results were, however, not as good or as lasting. An agglutination test was used to evaluate the response to the pertussis antigen. In 55% of cases children had a positive agglutination test result three years after a course of three primary injections of the multiple antigen. Two weeks after a booster injection the result was positive in 92%. Six months later it was positive in only 61%.

Toxicological Perspective in Planning Air Pollution Studies.

H. E. STOKINGER (*Am. J. Pub. Health*, June, 1953) discusses the effects of air pollution on urban health. He states that five acute incidents have been reported and studied in which deaths resulted from air pollution over a wide area. Reports indicated that no single substance but rather the combined actions of two or more agents were responsible for the injuries and fatalities. Toxic agents in each case were present in concentrations below levels known to produce such effects normally. Fatalities and illness occurred among members of the older age groups in which there is a high incidence of heart and pulmonary disease. The author suggests that irritant gases cause constriction of the bronchioles in these people. This results in reduced ability to eliminate carbon dioxide through the lungs and an increased tendency to acidosis, which is considered to be the common cause of death in people with chronic heart and pulmonary diseases. These effects may be increased by combination of the irritant gases with asphyxiants or toxic metals or by absorption on particulate matter. The author quotes the occurrence of chronic beryllium poisoning from minute atmospheric concentrations of beryllium originating from a factory in the vicinity to demonstrate that air pollutants can have chronic effects on health. Tables showing the constituents of industrial atmospheres are given and discussed. Eye irritation resulting from air pollution may be due to the interaction of ozone or nitrogen oxides with unsaturated hydrocarbons to form organic peroxides or similar oxidized compounds of high irritant potency. The author then considers the toxic effects of a few of the more important air pollutants. These include benzpyrene, sulphur dioxide,

fluorine compounds, hydrogen sulphide, nitrogen dioxide and arsenic compounds. Lines of further study are indicated; but the author suggests that before the problems associated with air pollutants are solved, engineering control may have reduced them to such an extent that air pollution will be no longer a problem.

Evaluation of Long-Term Radiation Exposures.

D. HOLADAY (*Arch. Indust. Hyg.*, March, 1953) discusses available data on the biological significance of small doses of radiation to the individual and the general population. These show that for many of the biological effects of radiation there is a threshold dose below which no permanent damage will occur. For certain effects, such as the production of mutations, shortening of the life span and possibly carcinogenesis, there is no lower threshold. Animal experiments and such data as are available on humans indicate that moderate radiation doses will increase the normal mutation rate. Furthermore, for this particular effect all radiation exposures are additive. Calculations of radiation doses from various sources, such as the industrial and medical use of radiation, indicate that it is possible for an average person to be exposed to biologically significant amounts of radiation. In these circumstances, the author considers that it would be advisable for all health departments to obtain data on the location of sources of radiation in their areas, on the levels of radioactivity in air and water, and on control and protective measures employed. Such base-line information would permit an intelligent appraisal of the extent of the present and future problems created by the use of radiation and would permit the responsible agencies to determine what their course of action should be.

Sanitation of Crushed Ice.

E. W. MOORE, E. W. BROWN AND E. M. HALL (*Am. J. Pub. Health*, October, 1953) have investigated crushed ice served in a series of food-serving units for the presence of contaminating organisms. They state that these organisms may be in the water from which the ice is frozen. They may be introduced with dust and dirt during freezing. The block of ice may be contaminated with dirt in the freezing and storage rooms. Organisms may come from contaminated implements used to crush the ice, or from contaminated crushed-ice containers, or finally from the contaminated hands of foodhandlers. Studies of crushed ice dispensed into iced drinks over a period of years showed that the ice often failed to meet a desirable sanitary standard. Evidence was secured that most of the undesirable bacteria were introduced in the dispensing of the crushed ice from the hands of foodhandlers. A comparatively simple technique was developed for chlorinating the crushed ice before dispensing. Two years' experience with this chlorination procedure in some 15 food-serving units has shown that the ice as now dispensed meets reasonable sanitary standards, and that there is no noticeable impairment of flavour in ice water and iced drinks made with the chlorinated ice.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on July 30, 1953, at the Robert H. Todd Assembly Hall, British Medical Association House, 135 Macquarie Street, Sydney, Dr. A. J. MURRAY, the President, in the chair.

Paralytic Poliomyelitis.

DR. G. S. COLVIN read a paper entitled "Some Recent Concepts in the Orthopaedic Management of Acute Poliomyelitis" (see page 71).

DR. S. E. J. ROBERTSON read a paper entitled "The Treatment of Acute Paralytic Poliomyelitis" (see page 73).

DR. N. J. ROYLE said that he agreed that patients should not be transported to hospital during the early acute stage unless their respiratory muscles were involved. He had in mind several patients whom he had seen arrive at hospital extensively paralysed; they had been transported long distances from the country. Investigation of their history showed that the paralysis was not nearly so extensive when they left home. Dr. Royle said that he did not think there was any true spasm; he thought that the pain in muscles was due to a local inflammatory process caused by the virus. He based that opinion on experimental work done by someone in New York, who had excised an affected muscle from a patient; pathological examination had revealed signs of an inflammatory process. He himself had seen muscles of mice infected with the Coxsackie virus showing signs of inflammation. Some patients did not seem to have much pain in muscles. He thought that hot packs and drugs gave relief because they relieved the local inflammatory reaction. Referring to the nursing of the patient during the acute stage, Dr. Royle said that he agreed in general with the positions on the slides shown by Dr. Robertson, but not with the positions given for the upper limbs. He thought that in the nursing of the patient the position should be varied in that the shoulder should be abducted and the arm kept more or less at right angles; the wrist should be in slight dorsiflexion and the thumb in the mid-position. The pathological changes in the cord caused by the virus were said to be over in about five weeks; Dr. Royle said that he did not believe it. When Professor Barr was in Australia a few weeks earlier, he had stated that changes in the cord were present for as long as six months. Dr. Royle did not see how else one could explain the recovery that occurred after as long as twelve months. One worker in England had shown that hypertrophy of the remaining muscle fibres did not play any part in the first six months. Dr. Royle agreed with Dr. Robertson that a positive pressure apparatus controlling respiration would be a great advantage in later physiotherapy and orthopaedic treatment. Some of the most difficult patients to treat were those who had been treated in a respirator; they were really stiff and could not move. Dr. Royle did not quite agree with Dr. Colvin that a muscle should be "written off" if it had a grading of only 2 after three months; he had seen such muscles reach a grading of 4 by six months, and a muscle like that around the hip might be very useful. If a muscle was to have a chance to recover fully, it should have a grading of about 3 by three months; but a muscle might still be useful which had a grading of only 2 at that time.

DR. A. T. ROBERTSON agreed that if the policy and ideas set out in the two papers were carried out, the treatment of paralytic poliomyelitis would be further advanced. It was far from being the case. Professor Barr had recently been in Australia, and everyone respected him and valued his opinion. In 1948 Professor Barr had said that prolonged immobilization produced inability to use the remaining muscle function. Others had supported the views of Ritchie Russell, who was working with many distinguished men and who advocated early active movement of the important muscle groups. He contended that there was no substitute for the patient's will to move a muscle. Fear of muscle fatigue after the acute stage had passed he held to be unnecessary. Yet in a recent circular sent out to medical practitioners by the Consultative Council for the Physically Handicapped, it was stated that adequate rest should be maintained for a year.

PROFESSOR LORIMER DODS said that he had been pleased to hear both Dr. Robertson and Dr. Colvin emphasize the importance of rest during the early days of the disease. It seemed most important that a regime of complete rest should be established at the earliest possible moment, and that this

should be maintained for at least the first two weeks of the disease. Nearly all medical practitioners were acutely aware of the real or supposed need for complete rest during the active phase of acute rheumatism, but many practitioners did not seem to be aware of the need for complete rest during the early days of an attack of poliomyelitis—a period when the frightening struggle which was to decide the fate of certain neurons was in progress, and when undue or unnecessary physical exertion or tiredness might swing the scales in the wrong direction. Appropriate explanation and reassurance—both for the parents and for the child of understanding age—and adequate explanation and sedation before an ambulance trip, a lumbar puncture or some other uncomfortable procedure represented very important early steps in this crusade for complete rest. Professor Dods agreed with previous speakers that, under certain circumstances, the child might be nursed in the peace and security of his own bed and his own home. In the treatment of this disease, all nursing and other clinical procedures should be reduced to the minimum, and the child should be given sufficient sedation by mouth to keep him just short of drowsiness. He should be fed by a nurse and protected from unnecessary injections, aperients, enemas and washing. Physical exertion and physical examination should be reduced to the absolute minimum, and any attempt to demonstrate possible muscle weakness—for either clinical or teaching purposes—should be avoided as far as possible. Finally, at some appropriate stage, the child of understanding age should be given a reassuring and carefully worded explanation of his disease, and should be protected at all times from easily audible, whispered remarks about "paralysis" of various kinds.

DR. W. D. STURROCK referred to the question of rest for the patient in the initial stages. He said that in the last few years, amongst his patients he had had two doctors. Both had complained of intense hyperesthesia, like very severe sunburn. The position in the slides as shown by Dr. Robertson would be a very uncomfortable one in which to nurse such patients. The average patient could not stay for more than about five minutes with his knees slightly flexed and his feet against a bed board. Dr. Sturrock thought he should be given a soft mattress and a low pillow. Patients were very restless, and the hyperesthesia was very important. Adequate sedation should be given; many of the patients complained that they could not be relieved of their pain and backache.

DR. J. M. ALEXANDER referred to postural drainage. He said that the placing of the patient at an angle of 15° might drain the lower lobes of the lungs, but most of his affected patients had developed atelectasis of the upper lobes. Another point was that in the past there had been too much tendency to regard the child suffering from poliomyelitis from the point of view merely of the muscles, not of the patient as a whole. That applied particularly in the case of the child who fortunately recovered without any paralysis. More stress should be laid on the psychiatric aspects of the condition. Dr. Alexander said that he had no doubt that the average patient underwent psychiatric changes; the changes might be in his mental outlook or his personality, or he might lose his ability to concentrate or be subject to temper tantrums. Dr. Alexander had found it so in every case. That condition had gone on for a period of at least twelve months. Although he did not agree with the idea of keeping patients home for twelve months, he did think that more attention should be paid to the psychiatric aspect of treatment.

DR. R. B. WILES said that the question of planning for the future had to be considered. From the papers they had learnt that the laboratory was providing information about what was going on. They knew that if a cell was subjected to physiological activity, it took a certain time for the rebuilding functions within the cell to restore it to its normal resting state. If the poliomyelitis virus was living in the cell, it was competing for those substances which the cell required for the reconstitution of its resting state. It was not known just how long the virus was competing, though a period of four to six weeks was suggested. Until that time had been determined, they must act conservatively for six weeks. But once the laboratory was able to give the information that the virus had burned itself out, it was time to review the position. Another point had been mentioned by Dr. Royle; many poliomyelitis victims had been thrown on the scrapheap, because after six or nine months' treatment they had not shown much response, and it was thought that nothing more could be done for them. But they could learn from what happened in other diseases. When a person got an infection in another part of the body, the tissues did not return to normal under about a year.

sometimes not for two years, because of the amount of fibrous tissue that had to be resorbed. Another relevant consideration was the length of time it took to train a normal athlete. It was known that a person could not be trained within a year; it might take at least two years of intensive training to produce coordination and maximum development of muscle power. Therefore, the weak muscle with a grading of 2 at the end of six months should not be discarded. Referring to the nursing of patients and the use of splints, Dr. Wiles said that they were most uncomfortable for the patient who could not move; they made him restless. The unfortunate child in the past who was immobilized for long periods of time was described as restless; the restlessness was largely due to the immobilization.

Dr. Robertson, in reply to Dr. Royle, said that he did not think a parallel could be drawn between the effects of the Coxsackie virus and poliomyelitis. The disease caused by the Coxsackie virus was primarily a muscle disease. Referring to the cause of muscle spasm, Dr. Robertson said that he had attended a meeting of the Royal Society of Medicine in 1951, at which six different experts all gave six different causes. Dr. Robertson agreed with what Dr. Royle had said about modifying the position for nursing the patient which he had shown on the screen. Referring to changes in the cord, Dr. Robertson suggested that Dr. Royle should consult a paper by D. Bodian, published in the *American Journal of Hygiene* in 1952, in which it was shown that the changes were finished at the end of five weeks. Dr. Robertson said that he could offer no explanation of the cases in which improvement occurred up to twelve months; he thought it might be due to muscle hypertrophy or trick movements. Dr. Robertson said that he agreed with what Dr. Roberts had said. He also agreed with Professor Dods's remarks. When a patient contracted poliomyelitis at any age at all, it had to be remembered that the unknown was always worse than the known. A full explanation should be given to both parents and child. It was a terrible thing to take a child to hospital with no word of explanation. It should be somebody's job to reassure the parents. In reply to Dr. Sturrock, Dr. Robertson said that the question was difficult, but he was inclined to agree about the mattress. But the positions shown on the screen were ideals to be aimed at, and it was impossible to keep children in them for very long. A footboard was very good; in practice sandbags were mostly used. If the patient had hyperesthesia, a hard mattress would be uncomfortable. In reply to Dr. Alexander, Dr. Robertson said that he wondered whether his patients with atelectasis of upper lobes who had been in respirators had a certain degree of pharyngeal paralysis with inhalation. There was not in Australia as far as he knew a respirator in which the patient could be put in the prone position. The psychiatric aspect of treatment was a good point, and tied up with Professor Dods's remarks. It was rather lonely being in a respirator, and must do intense harm to a child, quite apart from the effects of the virus on the central nervous system.

Dr. Colvin, in reply to Dr. Royle's remarks about there being no true spasm, said that numerous suggestions had been put forward in regard to the concept of spasm. Dr. Colvin assured Dr. Royle that he had read many articles on the subject, each of which made it seem simple until somebody else came along and upset the whole thing with a new theory. A local inflammatory reaction in muscle did happen in Coxsackie virus disease, and he had mentioned such a reaction in relation to muscle tenderness. He thought it was one of Dr. Sturrock's medical patients who had said that the tenderness was due to an inflammatory condition. This patient considered that it was a kind of "fibrositis" quite apart from "spasm". Referring to the position of the patient, Dr. Colvin said that it was not necessary to keep the arms strictly at a right angle. A limb could be supported in any position within the normal physiological limit of the muscles concerned; no harm would come to it, whether it was an active or a paralysed limb. With regard to what he had said about not continuing treatment of muscles that had not exceeded a grading of 2 in three months, Dr. Colvin said that he thought he had been misunderstood. He had meant that to apply only when no improvement had taken place. If a muscle moved from a grading of 0 to 2 within three or four months, it was improving and its treatment should be continued; but if it remained at a grading of 0 up to three months, it was unlikely to make any useful progress whether it was treated for twelve months or two years. Dr. Colvin said that he found it hard to understand the statement concerning "no hypertrophy of muscle fibres in the first six months" in the article by the English author that had been mentioned. If such was the case, provided nothing further was done than to keep joints mobile, and if all physiotherapy was dis-

regarded, the improvement which was going to happen should happen automatically. Dr. Colvin did not think that anyone at the meeting would agree that that was the case. In reply to Dr. Wiles, Dr. Colvin said that he was interested to hear a physiological statement about prolongation of the resting state. Physicians and orthopaedic surgeons, in making decisions, must be guided by their research colleagues. Referring to the length of time during which one should attempt to reeducate muscle, Dr. Colvin said that he felt a slight misconception had crept in. They had been talking about the death of a cell in the central nervous system. When they referred to the recovery of a cell in three to five weeks, they meant the histological appearance of the actual neuron, and it was the neuron itself and not necessarily every piece of associated tissue which recovered in that time. Many things went on after a period of a few weeks, such as fibrosis, for example, and they affected the final stage. To get the maximal result from reeducation of a muscle, it was not intended to imply that, provided one exercised the muscle for three months, one would be anywhere near obtaining its maximal contractual result. As he had said in reply to Dr. Royle, it was the possibility of the commencement of improvement which was the thing to be noted, and not the fact that the muscle had reached a grading of only 2. It might take upwards of a year or more to get the maximum result. The question was whether one should concentrate on one particular muscle; it must be weighed in the balance against the interest of muscles that had already reached a grading of 4 and upwards. Was it wise to keep them in disuse while one went on trying to bring up one muscle with a grading of 0 or 2?

DR. W. F. SIMMONS, who had taken the chair when the President was called away, said that the problem was ever before them, and fortunately knowledge was increasing from day to day. He thanked the speakers and those who had taken part in the discussion.

Public Health.

INTERNATIONAL SEMINAR ON MENTAL HEALTH IN CHILDHOOD.

An international seminar on "Mental Health in Childhood" was held at the University of Sydney from August 10 to 27, 1953. At the invitation of the Australian Government, the World Health Organization agreed to assist with funds for overseas lecturers and to provide fellowships for people from the countries of the Western Pacific Region of WHO. In addition, the Regional Director, South East Asian Region, WHO, made a number of fellowships available to the countries of that region to send one or more people to the seminar.

The objective of the seminar was to bring together workers in the fields of child health, education, sociology and child welfare from the countries of the Western Pacific and Asia for an exchange of ideas and information on factors which affect the growth and development of children from birth to six years of age.

It was agreed that the majority of the lecturing staff would be Australians, for whose expenses the Australian Government would accept responsibility. The World Health Organization arranged for four overseas lecturers in subjects for which suitable Australians were not available. The total lecturing staff numbered fifteen.

Letters of invitation to governments suggested that the participants should be relatively senior men and women who are responsible for planning and developing child health and welfare services and for conducting training courses for professional workers in these fields. Forty-seven participants came from Australia, Burma, China (Formosa), Hong Kong, Indonesia, Japan, Malaya, New Guinea, New Zealand, the Philippines, Sarawak, Singapore and Thailand.

The classification of the members of the seminar (lecturers and participants) according to their training and experience was: psychiatrists 14, paediatricians 10, maternal and child welfare service workers 7, social scientists and social workers 7, psychologists 6, nurses 6, educationalists 5, public health administrators 3, school medical service officers 2, teacher of public health and cultural anthropologist, each 1.

The multidisciplinary character of the seminar was probably the most important single factor responsible for

creating the stimulating atmosphere experienced by the members.

Similar international seminars with which WHO has been associated have revealed the value of members of the seminar living in the same hotel or hostel during the meeting. This arrangement allows for the maximum exchange of ideas outside the scheduled meetings and helps to develop a good corporate spirit. Through the willing cooperation of the authorities it was possible to arrange for the women to reside in the Women's College and the men in Wesley College, University of Sydney. The men and women could take luncheon and dinner at either college.

The Institute of Child health was requested by the Director-General of Health to organize and conduct the seminar.

The Conference Event: Organization and Structure.

The work of the seminar was conducted in both plenary and group meetings. As a rule there was one plenary meeting each morning and afternoon; these lasted about forty minutes and were followed by meetings of the groups in which the topic of the plenary meeting was discussed. There were six multidisciplinary and multicultural groups, each with about eight participants and two faculty members, one of whom had some skill in discussion methods.

In addition, one meeting was held of eight professional groups to discuss various aspects of "planning to meet the psychosocial needs of children". A working library was assembled in the Women's College, and a librarian was in attendance at times when the members would be free to use the library. The discussions were organized into a number of themes, each dealing with a particular aspect of child health. The main ideas presented in each theme are rather briefly summarized here; the title of the opening paper or the theme and the opening speaker or speakers are also shown.

Theme I. The Child as an Individual.

Some Aspects of Personality Development.

DR. ELWYN MOREY said that personality was an inner state, being unique and specific to the individual, depending upon his own perceptions and motivations. Personality was organized and predictable, but was also dynamic and changing; adults could know the infant only to the extent that they could recapture its inner experiences. Temperament (the emotional aspect) and character (the moral aspect) were dimensions of personality. Personality was the product of both heredity and environment, inextricably interwoven. Genetic factors determined certain potentialities, which might or might not develop; certain constitutional features affected an individual's reaction to others, constitutional differences in strength of biological impulses, general activity level and biological rhythms. The limits which heredity set on individual personality development were unknown. Individual differences in personality arose as much from life experiences as from hereditary endowment.

Personality developed through the processes of maturation, adaptation and learning. Maturation depended chiefly on the central nervous system sensory development and neuro-muscular coordination. Adaptive behaviour depended on the ability to act purposefully and in relation to a goal to satisfy one's needs and to profit from past experiences. The first type of learning was by contagion, which was the transmission of feeling from the adult to the baby. Through contagion a baby might grow in confidence, assurance and responsiveness or he might become nervous, timid and withdrawn. Through experiences, both pleasant and unpleasant, babies and young children developed certain conditioned reactions, for example, shyness with strangers, fear of the dark. Communication and associated experience were also ways by which the baby learnt.

Those processes led to the gradual awareness of the self, the core of personality. Later developments extended and enlarged the concept of self through the child's private world. That was the individual's attempt to integrate his own inner wishes and desires with the environment, internal, geographical, social and cultural, in which he must function. At the same time he perceived, organized and interpreted the world according to what he had learned and how he felt. The centre of that private world was the image he developed of himself.

The Possible Relationship of Events in the Pre-Natal Period to Personality Development.

PROFESSOR L. DODS said that congenital malformations could affect personality development in a number of ways. First there was the effect of the deformity on the child.

Something was now known of the cause of certain congenital malformations. It was known that rubella during pregnancy might be responsible for cataracts, deafness and congenital heart disease. Although a certain number of congenital malformations had been reported after other virus diseases such as measles, mumps and *herpes zoster* occurring during the early months of pregnancy, they could not be incriminated at present but must remain suspect.

There was a significant increase in the incidence of congenital defects amongst infants born to mothers of more than thirty-five years of age. Uterine hemorrhage, of a significant degree, occurring during the first trimester, was frequently associated with a malformed infant, likewise hydranmios. Very little was known about the effects of sublethal doses of abortifacient drugs. Radium and X-ray treatment of the pelvis during early pregnancy was known to produce microcephaly and mental retardation.

The bulk of available evidence suggested that disturbances occurring between the sixth and ninth weeks of intrauterine life were responsible for the multiple developmental "arrests" and anomalies which constituted Mongolism.

The other important factor was the way a mother responded to any defect or deformity her child might have. That frequently depended on how she was told about it. How and when was the mother to be told that her newborn infant was grossly deformed?

A consultation between a medical practitioner and the distressed mother of a grossly deformed or mentally deficient infant called for a great deal of tact and sympathy on the part of the practitioner, who must have some genuine understanding of the mother before he could offer the "explanation". By "explanation" was meant a reasonable explanation of the infant's defect or deformity, some simple and carefully worded explanation of its aetiology, some attempt at explanation of the road which lay ahead for the mother and her infant, and finally explanation and discussion of treatment and of the general management of the whole problem, as it affected the mother, the child and other members of the family.

Events and Conditions in Post-Natal Life which Might Affect Personality Development.

DR. RONALD MACKEITH said that Rhesus disorder was the commonest congenital disorder in England; it occurred in one in 400 babies born. It was not an important cause of death at birth, but a few children survived with cerebral palsy. That condition followed in a few children who had brain injury at birth, but nine out of ten of the children so affected at birth recovered completely. Later behaviour problems were, if anything, commoner where labour had been brief.

If the oxygen supply to the brain was cut off, the blood vessels dilated and then bled; with more prolonged anoxia the nerve cells died in patches. Anoxia had been said to produce failure of visuo-motor perception, brief attention span, difficulty with arithmetic and emotional lability. Any effects of acute illness on the personality of the child depended upon the reactions to the illness of the adults around the child.

Breast-feeding was now advocated to promote a close relationship between mother and child and to help develop sound emotional health. Most infants would easily adapt themselves to almost any regime; but because a regime suited many children, it did not follow that it could be appreciated by all. Older infants seemed to tolerate a four-hourly schedule, but newly born infants were more variable in what suited them best.

Many older children had recurrent symptoms, abdominal pain, headache, vomiting, pyrexia, bilious attacks and adrosis. In most of those the trigger of the attack was an emotional disturbance. A not uncommon antecedent appeared to be strict early training.

It was imperative to study how emotional factors had contributed to the causation of symptoms in the children who came under observation. That required time, care and imagination. Adrenaline was secreted in situations demanding flight or fight. Palpitation and pallor might be reasonable reactions in an alarming situation, or they might be signs of a neurotic state. The adrenal responded to crises by secreting cortisone; and if it was not secreted, the body did not meet the crisis properly. Spitz believed that the developmental failure of motherless infants was due to failure of that normal response to stress.

The Child's Social Development.

DR. IRENE SEARS said that a child passed through several transitional stages in his development, each implying certain

expectations in terms of the norms of his particular culture and of his corresponding age. It was necessary to examine what the child brought to his social situation and what was imposed on him externally. A child's behaviour, his capacity for accommodation, his success or failure in socialization needed to be interpreted in terms of the total whole functioning. Each of those present with his particular professional prejudice and specialized experience did not always examine a child's total behaviour in the light of its physical, intellectual, emotional and social components.

The quality of the mother-child relationship, with its reciprocal qualities, formed a significant experience physically and emotionally which largely determined the child's progress to further social maturity. The mother provided opportunities for the child's identification with a particular figure, the important ingredient in all social relationships.

There was growing support for the opinion that psychopathy had its origin less in constitutional factors than in defective mother-child relationships which negated the acquisition of a social conscience.

Children varied considerably in their tolerance of restrictions and indulgence. The intensity and frequency of restrictions and frustrations determined whether or not they were transient or were being incorporated into the personality. It was also necessary to distinguish between intolerable frustration and that which served as an introduction to real situations in the future life experiences of the child. The first interference with his satisfactions came from requirements imposed by the mother, prohibitions and permissions which denied or encouraged the expression of natural impulses. The home continued to provide experiences calling for further adjustments; patterns of behaviour developed in response to parental attitudes and example, disciplinary measures and family structure.

Play activities, with their rich field for explanation and experimentation, brought improvement of skills, contacts in group experiences and the growth of combined social experiences. Those carried him beyond the family circle. Some communities were providing pre-school centres for young children. What was the significance of the surrender by the family of many of its traditional functions in child-raising to outside agencies?

Psychoanalytical Theory of Early Personality Development.

DR ANDREW PERO said that clinical observations of feeding disturbances indicated that the young infant was capable of forming object relations—in other words, experiencing love and hate towards the mother. Drives (instincts) that were pleasure-seeking (called by Freud sexual) and aggressive formed the basis of the child's object relations.

The first of those was the oral component. It found satisfaction in breast-feeding. However, there were intervals when the child was deprived of his mother as an object. The instinct made the child's own body its object. He sucked his lips and put his fingers in his mouth. The mouth was also the source of oral aggression, as was seen from the biting of the nipple by the teething child.

The hand and anal and genital regions provided other sources of infantile sexual component instincts and of aggressions. They were not clear-cut phases, but overlapped and changed with every child. The instinctual drives supported intellectual development. They were the instigators of the search into the understanding of the environment and in discriminating between self and non-self.

The absent mother was replaced by the child's own body. The child-mother relation could be re-created in the child's relation with his own body. The better balanced the mother, the more opportunity there was for the child to build up identifications with a good mother *imago*; a mother's unbalanced attitude facilitated the dominance of hateful phantasies. Ambivalence was fed by the pleasant and unpleasant experiences of the child. Parental care developed pleasant phantasies about being looked after, being possessed lovingly and possessing through love and force.

Simultaneously, the child's aggression, tempers and intruding tendencies involved him inevitably in punishment, denials and frustrations. That created anxieties about not being loved and being threatened and rejected. The neglected child then felt himself entitled to hate his parents and to attribute to them, through projection, all his aggression.

Two other important social adaptations that began to operate at that stage were disgust and shame, by which interest in socially unacceptable things, such as feces, were replaced by the opposite, shame and disgust. By identifying

himself with the external authority, the child was helped to give up and to despise things he liked.

At about four years of age, the child developed strong physical attachment towards the parent of the opposite sex, with parallel aggressive aims for the elimination of the parent of the same sex. Both drives were mainly in the child's thoughts and phantasies. Play was the most important means the child had of dealing with those conflicts.

Theme II. The Child and its Relationship to the Community.

Family Patterns and Child Care.

PROFESSOR R. FIRTH said that in no human society, however complex its marital relations (monogamous, polyandrous or polygynous, the last in all its forms), was there complete loss of individualization or of the peculiar intimacy of mother-child relations. However, unequal treatment of children in a polygynous household could make a child's life unhappy. The possibility of having to obey someone else than one's own mother, without the mother's being able to intervene and soften the discipline, was likely to affect the child's sense of security and lead to anxiety formations.

Patterns of family authority could affect the development of children. In many Asian-Pacific societies the father shared with the mother the responsibility for the care of the child. Thus it might be taken as a hypothesis that there was less resentment by the child against exercise of the father's authority than in Western society. Also in the Asian-Pacific field the major structural principle was often not patrilineal but matrilineal. The mother assumed greater importance in regard to matters concerning the child, and the mother's brothers tended to occupy the place and to be given the respect usually reserved for the father in patrilineal societies. An important feature of family structure in the Asian-Pacific region was the prevalence of adoption of children, mainly because of the idea that to have small children about the place was a pleasant and good thing.

The size of the family or kinship group could have a considerable influence on the atmosphere in which a child grew up. In many Asian-Pacific societies the range of people who cared for the child was much wider than in most Western societies. In bodily handling, for instance, the child was accustomed from birth to being picked up and fondled by many people of both sexes. For a great deal of the child's ordinary activity it was customary to look not on one woman only as mother, but on any one of a set of women.

In most Asian-Pacific societies children were wanted; they were socially important. Infant feeding was more permissive, and suckling was apt to be long-continued. In some societies weaning was rapid, and psychological and physical strains on the mother were recognized; but, on the whole, it tended to be a protracted process. Disciplining of the young child was apt to be less rigid. In general terms, the child was, at an early age, encouraged to relative independence.

Family Patterns in Western Culture.

MISS NORMA PARKER said that family patterns in the West, as elsewhere, were determined in three ways: (a) by the personalities within the family group and their interaction; (b) by the specific social situation in which the family found itself, rural or urban locale, exposure to experience of social stress, unemployment, chronic illness and the like; (c) by the culture in which they existed and the form the family took, ideas about its roles within it, traditions and ideas about child care, and cultural changes which were taking place.

In the life of the young child from birth to six it was the personalities within the family group which were of direct and primary importance. Environmental influences, provided they were not so unfavourable as to threaten survival or impair growth, reached the young child, not directly, but through significant adults in his life.

An important element in family behaviour was the degree of maturity and emotional adjustment of the parents when they entered marriage and assumed parenthood. All degrees and varieties existed. When they were of poor quality, the children usually failed to develop the sense of emotional security.

In considering the environmental factors it must be realized that some parents had difficulty in giving enough to their children, not because they had not developed a capacity for giving love in their own childhood, but because their present circumstances were so demanding, frustrating and disturbing that they had little creative energy left to put into relationships with their children. Those environ-

mental stresses had become less in Western cultures in the last fifty years, but they still existed in Asian-Pacific societies.

Smaller families and the concentration of large numbers of people in large cities had provided a different set of problems for urban families. Expectations about requirements for children had changed, and parents expected and were expected to give their children more opportunities and a higher standard of care.

Should the community provide services of various kinds to help parents? Clinical evidence suggested that the quality of parental care in some cases varied with the satisfactions parents were deriving from living and the support given them. Social agencies and child guidance clinics saw great improvements in family atmosphere as mothers felt supported in an understanding relationship, with the social worker or clinic team. It would appear that a number of families in the community needed support of that kind.

The Child and the Community in South-East Asia.

DR. F. J. BULSARA said that most of the countries of South-East Asia and the Western Pacific regions, except Japan and Thailand, had achieved their independence only recently. Most of them, except Burma, the Philippines and Thailand, had very pressing food problems to solve. Food production had lagged far behind the growth of population. Overall literacy ranged from 18% to 60% in countries of those regions, except Japan. Public health and medical services were scanty, although they were gradually increasing. Training facilities were equally scanty, except in Japan.

Though the subject of mental health of children might not have received in Asian countries the scientific attention that it deserved, it could not be denied that its importance was as fundamental to Asia as to any other group of countries.

Certain traditional traits and customs of child rearing were widely prevalent in Asian societies. The average child grew up in a joint or large family. He remained for a much longer period with the mother and was usually breast-fed for a longer period. There was less conscious attempt on the part of the mother and other adults to interfere with the child's growth and development, although he was taught the general rules of behaviour valued by the group or community. Among the rural and less sophisticated families there was greater tolerance of the child's spontaneous activities and behaviour. Those children also helped in daily chores of life and thus entered into adults' ways much earlier than in Western communities. The rate of divorce was comparatively low, and the incidence of the trauma of separation and broken homes was much lower.

Those conditions were not static, but were even now subject to change in the economic, social, cultural and political fields. The pace of change was going to be more rapid than some tired or sluggish minds might like, because of the new factor injected into social change in the twentieth century—namely, the replacement of drift by design. Another factor to be considered was the high state of readiness and receptivity for change that had come over Asian peoples.

There was in every Asian country considerable interest in child care and development, and that extended to mental health of children. The real problem was the provision of funds to allow the ideas already developing to be put into operation. It was important that development should be by the application of accepted principles to the particular culture and not by trying to adopt mores from one culture to another.

Changes in Authority and Conformity of Children (in Australia).

MISS GLADYS PENDRED said that Szurok had made a distinction between authoritarian and authoritative. Authoritarian was the coercive power exercised by the dominant person primarily for his own rather than the subordinate's immediate gain; authoritative was where the authority was derived from superior competence and skill, the purpose being to promote and foster the acquisition by the subordinate of the competence and skill of the authority.

In the early part of the present century the attitude towards children had been authoritarian, affectionate and harsh. Children had acknowledged the parents' authority (with some rebellion, but with general obedience, reinforced by rewards and punishment). After World War I a great many factors had led to a growing awareness of the importance of the child as an individual and the relation of childhood to adult life. There had been a gradual acceptance

of the belief that repression of children was responsible for personality readjustment in later life and that the old authoritarian attitude must be replaced. Because those changes did not affect everyone to the same degree, there had been some conflict between older and younger generations.

Today, the attitude was more authoritative and was shared by both parents; although in some families there was conflict, because of differing concepts of discipline held by each parent. Since society placed a high emphasis on personal property, the young child was forced to recognize a large number of taboos in the average home—furniture, ornaments and garden space. The child must learn to adapt himself to people, not only in terms of basic relationships, but also in terms of the traditional manners and courtesies to which different parents gave varying importance.

If there was tolerance for immaturity, but uniformity and stability in the day-to-day guidance, the parents' own example and supportive authority gave children a sense of order and direction. That provided a key (or mechanism) by which conflicts might be resolved and was conducive to mental health. A few years earlier the emphasis had been on teaching parents to say "yes"; now it would appear they needed help in learning when to say "no".

A child needed the concept and presence of authority. He was not able to carry the responsibility for his actions alone, but needed support and guidance, and only through the presence of authority was he able to develop guiding ideals.

Summary of Discussions on Theme.

Professor R. Firth, in presenting a summary of discussions on the theme, said that significant differences in family structure and community values had been shown to affect the development and welfare of the child. A relative deficiency of total resources available in the Asian-Pacific countries for developing social services to aid the mental health of children had been an important element in the discussions. The importance of reconciling the needs of each child to develop his own personality and at the same time to equip him to be able to take his place in society and to get satisfaction from contributing to its welfare had been recognized by all participants.

As the discussions proceeded there had come a growing awareness of the impressionistic nature of a lot of the data presented. Middle-class intellectualistic practices had been often cited as if they were general. The concept of permissiveness had been scrutinized and seen to have a number of different contexts, each of which implied a somewhat different meaning or degree of operation. It was considered that the term should be applied to freedom from restraint in specific fields of behaviour and not used as a label for the quality of a culture. There were no permissive cultures. All societies imposed restraints in some fields.

The discussions had taken place on three main fields of relations:

The first was that of specific community organizations. The question arose of how far the possible conflict in values or in answers to questions between school and home affected the security of the child. That problem was probably greater where education of a Western type was newly introduced and parents were still traditional in their outlook. It would seem to call for a parental education programme. Also, the cost of child health programmes must be considered. Where limited funds were available, should there be a system of priorities? The question had been asked whether it was sound social theory that where only very limited funds and personnel were available, it was better to spend them on healthy children.

The second field was that of the home—the "eternal triangle" of father, mother and child. Breaches in the structural unit must occur with widowhood and divorce. The effect upon the children depended on many factors. The role of the mother was freely recognized, but the importance of the father was probably greater than was usually imagined by many. Separation from the father of a child under two years of age could result in only superficial damage to the child. Later separation, if prolonged, might cause severe damage to the personality of the child. In any study of the effects of marital relations on the mental health of the young child one should not concentrate on "broken homes" and similar phenomena, but should also give attention to what appeared to be ordinary families.

The third field was that of controls. Those had complex aspects, but the seminar nowhere seemed to hold the

traditional view that discipline in itself was a good thing. For a child up to six months of age treatment must be mainly permissive. From six to twelve months more controls should be gradually introduced as the child was able to take them. The tempering of controls to the stage of maturation of the child was regarded as being of cardinal significance. Frustrations must come into the life of the child; they were not only necessary but actually desirable for the development of the child. The personality of a young child in a large degree was a function of the personality of his parents.

There was a growing awareness of the significance of the problems of the young and the need for some coherent method of tackling them. Planning for childhood by modifying the parental environment was now a conscious process on the part of the State. It was necessary to be aware of the growing complexity of the material environment of the young child and to ask whether that was compatible with a simplification of emotional relations and controls.

The occupational structure of a modern community was significant in the whole problem. The employment of women outside the home, the desire of the young married woman and even the young mother to continue their employment posed questions not yet answered. The solutions seemed to be more difficult in urban industrialized communities than in small-scale agricultural groups.

Theme III. The Effects of Separation on Children.

DR. A. JENNINGS, DR. R. MACKEITH, DR. A. PETO AND DR. J. WILLIAMS discussed the effects of separation on children. It was stated that separation in that sense was used to describe the separation of a child from its mother or permanent mother-substitute for a relatively long period or permanently. Death of the mother, her admission to a hospital and admission of the child to an institution were the common ways in which that occurred.

Recent surveys on the effects of separation of very young children from their mother indicated that infants and young children deprived of adequate maternal care might suffer in their physical and emotional development. The reactions to separation varied in degree, and the symptoms varied with the age at which separation occurred, its duration and the state of the child's emotional development at the time. The role of other factors was less clear; little was known of the reasons why some children could tolerate separation better than others in apparently similar situations.

The importance of separation as a socio-medical problem seemed to be greater in Western societies with their smaller, more isolated families. In most Asian-Pacific countries there were generally mother-substitutes within the family, ready and willing to step into the breach whenever the mother was not able to fulfil the role. The large family, as a rule, meant that the mother-substitutes had their function throughout the life of the child.

Infants in their first half-year of life, when separated from their mothers and left with only routine feeding and cleaning, became listless, immobile and emaciated; they slept poorly and lost their sucking habits, and there was an increased susceptibility to illness. That might develop insidiously. It was not met with in the first few weeks of life, when provision of physical care appeared adequate, but it occurred in varying degrees after that. In the most severe reactions, there was a drastic fall in the developmental quotient, which might be difficult to overcome, even when the child's situation improved. The infants responded well to a mother-substitute, such as reasonable nursing and attention during that period.

When separation occurred in the second half of the first year, after the mother had been recognized as a particular individual, infants reacted at first with weeping and apprehension. That might be followed by severe depression, with arrest of development, loss of acquired functions, reduction of responsiveness and rejection of the environment. Provided that was not too advanced, there was rapid recovery on return to the mother. A mother-substitute helped to minimize the reaction, as did allowing plenty of activity and giving plenty of attention. Some infants of that age did not react in that way to separation; the tie to the mother had been poor, and they had lacked the capacity to relate well.

Separation in the second and third years might be tolerated if it was for a short period. However, the response was usually just as severe as in the first year and was accentuated because mother-substitutes were also rejected. Even the most skilled found that they were unable to prevent regression in that age group.

On separation the child might show an initial phase with confusion and anxiety. He might refuse food, called for mother and might stand violently shaking the cot. After a few hours or a few days, that might change to despair and the child become withdrawn, apathetic and depressed. Physical activity was reduced, and the child made few demands on the attendants. That might erroneously be interpreted as diminution of the child's distress, and he was thought to be settling in. Later he might appear to recover and show more interest in his surroundings. He would look for comfort from people other than his mother. He might be able to adopt a substitute and build up a relationship, or he might, finding no substitute, relate only in a very superficial way. He would show little feeling when the parents visited; in fact, he would show no real feeling for anyone. He was in a state of "frozen emotion".

If he returned home after a few weeks, there would be, in the "unfreezing", a confusion of hate and love and the demanding behaviour of an insecure child. If the relationship in the pre-separation period had been good, much of that would still be present; and with understanding and tolerant help, the child would settle down again at home. There might, however, be underlying anxiety, which was reactivated at later separations. If the "unfreezing" was met by hostility, the child might be driven to further protective mechanisms.

If the separation continued and the state of "frozen emotion" persisted, it might become irreversible, leading to a character defect, when the child was unable to respond to or reciprocate affection, though he might crave it.

In the histories of delinquent and disturbed characters, who showed no apparent ability to love or feel guilt, separation from the mother for a long period in the first years of their lives appeared a prime cause for the faulty development.

Separation might still be serious in the three and four year old groups, but the vulnerability began to decline. Those children could have the situation explained to them, and they were more tolerant of frustration.

Explanation and careful handling could minimize the effects. At that age, the better the child's relationship with the parents, the better he could cope with separation; the insecure child had his conflicts activated.

Five year olds and those older might be homesick and show poor concentration and vagueness after the separation, but they were better able to suspend relations with the parents and to take them up again on return. Investigations made had indicated the major reactions to major degrees of separation; more was to be learnt of the minor responses to minor degrees of separation.

Hospitalization was one of the commonest forms of separation of children from their parents. There was much evidence suggesting that hospitalization did affect some children adversely. Although the evidence was not conclusive, it was, however, sufficiently strong and constant to justify further research and to warrant action as if it was true that the separation of hospitalization could be harmful.

Could anything be done before a child was admitted to hospital? Operations of election provided an opportunity to prepare the child; it was desirable not only to tell the child what would happen, but also to try to tell him how he would feel.

It would seem that a constant attempt should be made to avoid taking children under five years of age into hospital, and when they were admitted, to get them home again as soon as possible; full recovery could often be completed at home.

Many of the effects of physical separation were seen in the child who had experienced "emotional separation", the autistic child, the product of extremely cold or emotionally absent parents.

The large-scale military operations of the second World War had given a sad opportunity to observe the devastating effect on the mind of the growing child. Relatively the slightest trauma was that represented by the father's absence. Love as well as hate were concentrated on the mother. Ambivalence developed to a higher degree. The sense of guilt could not develop evenly, because one of the main figures—the source of helpful identifications—was missing.

A wholly unexpected consequence was that all children developed phantasies about the mother's responsibility for the father's absence. They blamed her for their loss. Lack of family security increased the anxiety situations and aroused an excess of aggression in many children. Extreme

hardships—if they were not permanent—had only an indirect impact upon the small child.

The following factors exerted a beneficial effect in counteracting the disruption of the home:

1. A well-balanced mother gave the child a feeling of security. The mother's thoughtfully protective love was a strong barrier between the child and the outer world. Not only reality but also the child-mother relation was an important determinant in danger situations.

2. If the danger situation lasted over a long period the child's opportunity for playing was of great importance. The horrors had to be played through. That was a desperate effort to overcome anxieties through the repetitive compulsion of play.

3. Constancy of milieu was of paramount importance. Permanently uprooted children were unable to play, destroyed everything and fought aimlessly. Recovery began only after several months of optimal conditions.

4. Those traumatic situations were often aggravated by starvation. The starving child blamed the mother as the representative of the whole neglectful world. Food was the symbol of parental love; if it was scarce, there was less opportunity to build up helpful identifications. Anxieties and subsequent dullness or aggression followed.

Those children who were exposed to the traumata mentioned showed in overwhelming majority behaviour disorders after the lapse of two or three years. Those disorders were often of a grave character.

Theme IV. Behaviour Disorders.

Some Typical Disturbances in Children and Their Meanings.

DR. A. PHILLIPS said that many disorders of children resulted in retardation of development or even caused regression; the resulting appearance of intellectual sub-normality might cause a child to be labelled as "mentally defective". The principal features leading to that mistaken diagnosis were reading difficulties, speech retardation, delayed maturation and personality disorders.

The importance of differentiating those disorders from mental defectiveness was emphasized by the fact that child psychiatry had begun to make substantial progress only after tests to distinguish the true defectives from others were invented.

Behaviour disorders might be secondary to some pathological condition or primary—in other words, reactive to the environment. The present discussion dealt only with the primary behaviour disorders, which could be divided into (i) the habit disorders, (ii) primary conduct disorders and (iii) behaviour disorders of psychoneurotic origin.

Habit disorders were excessive or persistent manifestations of certain aspects of infant behaviour and related to the child himself rather than to others. They were primarily defensive mechanisms, with the function of discharging tensions and relieving anxiety, to which the infant was particularly vulnerable because of the absence of a well-developed ego. The causes for a habit disorder were to be looked for in each individual case. Some examples of habit disorders were finger-sucking, finger-pulling, nose-picking, head-rolling, head-banging and rocking. When mothering was inadequate or excessive, there were various possibilities of disturbance. The over-stimulated child became anxious, the deprived child became retarded and the over-protected child prolonged his infancy. Habit disorders might be part of the picture in all those cases.

Primary conduct disorder was associated with massive and multiple behaviour disturbances; the child was disturbed in all areas of his behaviour. The aggressiveness, acquisitiveness and sexual activity of such children indicated their need for immediate instinctive gratification without regard for the consequences. They did not respond to punishment except by increased hostility. They showed an apparent absence of guilt feelings.

Such children had often been deprived of family life from an early age; and because they had not been loved, they had not learned to love, and their relations with people were superficial.

Behaviour disorders might be evidence of psychoneurotic traits. The child was attempting a solution of an intrapsychic conflict. Such children were laden with anxiety and guilt. The disturbance might be confined to the school or home and frequently referred to one symptom only. Retrospective studies showed a period of disturbed relations extending into the latter part of the pre-school periods, relating often to emotional difficulties with both parents.

Nervous Disorders in Children and an Approach to Therapy.

DR. D. W. H. ARNOTT said that children might develop acute psychotic illness with rapid intellectual deterioration; they might show acute regression to infantile levels; they might develop hysterical paresis; but most commonly nervous illness exhibited itself in changes in personality and behaviour such as undue contrariness, irritability, loss of confidence, emotionalism, shyness, aggressiveness, temper tantrums, lying, stealing and so on.

The common factor in each of those was the rise of psychic tension, which became intolerable and for which relief must be found. A rise in psychic tension accrued when any instinctual drive was frustrated, or when fear, anxiety, anger and misery, inferiority and other negative emotional states were roused. The threshold point at which psychic tension became intolerable varied; but once reached, it split over into intellectual, emotional, behavioural or automatic (somatic) pathways.

Responses might be excitatory (aggressive reactions, temper tantrums, violence, screaming fits, nightmares, antisocial behaviour) or prohibitory (undue shyness, negativism, social withdrawal, regression of speech and conduct, loss of concentration and attention, depression).

The approach of the physician or psychiatrist to the treatment of a nervously disorganized child must vary according to his experience.

The first decision was whether it was (a) a normal child who was reacting neurotically to undue environmental stress, frustration or deprivation, or (b) a handicapped child who was reacting neurotically to the frustrations caused by his handicaps even under normal environmental stress. Handicaps were of several kinds. There were children with a general warping or immaturity of the personality, shallow and affectionless people, who had not developed the power of making relations with people. There were children with specific physical and mental defects, those with emotional handicaps shown by undue shyness and those with social and psychomotor handicaps who drifted into a withdrawn seclusiveness in spite of efforts to help them.

Treatment was aimed at modifying the environment for the normal child and at trying to build up the immature qualities of the handicapped to somewhere approaching average performance.

Theme V. The Psychological Problems of the Handicapped Child.

Medical Aspects.

DR. RONALD MACKEITH, discussing the medical aspects associated with the psychological problems of the handicapped child, said that handicapped children should not be thought of as entirely different from other children. Every child was handicapped at birth, unable to walk, talk and even to see properly. The effect of physical handicap was to prolong the infantile situation of the child. The effects of a handicap depended greatly on whether it was present from birth or acquired after a year or so, in which the child's personality had made a good start. Handicaps present from early life affected the child's personality by limiting the child's experiences of his environment and by the reaction they induced in the child's parents.

The deaf child heard little, the blind child saw nothing, the cerebral palsied and the blue congenitally heart disordered children got inadequate opportunities for exploring the world. The handicapped child frequently had difficulties in mixing with other children and turned to his mother, who might not encourage him to grow up and away from her. Frustrated normal aggressive feelings might be revealed in the pictures that physically handicapped children drew. Quiet friendly children, given the chance, could put "more blood and murder to the square inch on paper than one would think possible".

Parental reactions to handicaps might be influenced by feelings of guilt that either parent might sustain or by feelings of distaste at the thought of the deformity or the actual appearance of the child. Parents' reactions might be (a) outspoken rejection leading to cold treatment or placement in an institution (both reactions producing separation), (b) unconscious rejection leading to over-protection and a timid, easily defeated child, or (c) acceptance without unreal expectations, which gave the best chance for the child to have a zest in life and an adaptable personality.

The Handicapped Child and His Parents.

MRS. GEORGE M. TRAVIS said that the child with congenital defects or birth injuries, the child with early crippling and the child who was put into hospital constituted groups with some experiences which were different from those of the others and from those of physically normal children. However, they shared with all children a primary need for maternal love and for an extra portion of that love when the world inflicted painful and frightening experiences upon them.

Maternal love, despite its extraordinary durability, existed only as the mother was nourished by a well-spring of child-hood satisfactions, marital support, relative health and freedom from overwhelming stress. The physical handicap of her child might make her invest even more of herself in him, but it also might prevent her from loving the child or it might call for a mobilization of inner resources which did not exist, because they had been too greatly sapped by other concerns. Even the best adjusted mothers with every seeming advantage bowed under the tragedy of a defective baby. They deserved the most acute perception of their feelings and the best help. The quality of love they were able to give the child was improved to the extent that the specific concerns of the individual mother were understood and alleviated.

The attitude of the mother towards her baby would be coloured by how her community looked at defective children, by her own level of maturity, by the happiness of her marriage and by the general socio-economic conditions of the family.

In the Judaic Christian culture of the West, the psychological heritage of an all-seeing wrathful God, who punished men for their sins, would seem to account for widespread reactions towards congenitally handicapped children. Those cultural vestiges and an accepted myth that all mothers loved their children created the base for an intricate and devastating psychological pyramid. Feelings of guilt were likely to surge in on the parents, and particularly the mother, from both those sources. Guilt haunted many mothers, because they believed that all mothers were expected to love their children, and they knew in their hearts that they did not love their handicapped child. Several common reactions sprang out of guilt.

The feelings the handicapped child had for his brothers and sisters, and their feelings toward him, rose out of the natural rivalry children had for their parents' attention. If the handicapped child got more attention than he would normally, because of his illness or accident, his development was, at least, not marred by insecurity and jealousy though it might be by spoiling. When he was given special foods to eat—such as an orange or an egg—and the children longingly watched him eating them, or when the mother could not attend an older child's school party because she had to take the crippled child to the clinic, foundations were laid for jealousy and retaliation. Or conversely, if the father let a well child go fishing with him, but the crippled child had to stay at home, inferiority, jealousy and retaliation were laid down the other way. Children attached meanings to such little incidents of home life, which shaped their personalities. Parents must be possessed of extraordinary wisdom and maturity if they were to avoid ambivalence in family relationships when a serious and long-term health hazard occurred in one of the children.

The mother's ability to accept the child and give him the care he needed was influenced by her freedom from guilt over his handicap and freedom from excessive environmental and emotional pressures. Medical programmes were called upon to help her when problems were recognized in her acceptance and care of the child, because poor attitudes and poor home care might affect medical treatment itself and because they defeated its larger aim. Successful help was built upon a foundation of understanding the underlying difficulties in each case. It frequently required the use of social resources in the community. Widening the scope of medical care programmes to make those things possible raised the original cost in money and time, but without them waste of medical resources and human values occurred.

The Concept of Mental Health and Some Basic Principles.

During the seminar there was evolved a strong desire to develop concepts of mental health which could be used by members and others as a guide to the development of programmes to meet the psycho-social needs of children. The following basic principles emerged:

1. Health is a state of complete physical, mental and social well-being and not merely the absence of disease or

infirmity. This state of general well-being is possible only when there is absence of want.

2. Mental health is an essential component of this concept of total health.

3. We must accept the definition of "mental health" as formulated in the report on the second session of the Expert Committee on Mental Health appointed by the World Health Organization, which states:

Mental health, as the committee understands it, is influenced by both biological and social factors. It is not a static condition, but subject to variations and fluctuations of degree; the committee's conception implies the capacity in an individual to form harmonious relation with others, and to participate in, or contribute constructively to, change in his social and physical environment. It implies also his ability to achieve a harmonious and balanced satisfaction of his own potentially conflicting instinctive drives—harmonious in that it reaches an integrated synthesis rather than the denial of satisfaction to certain instinctive tendencies as a means of avoiding the thwarting of others. It implies in addition an individual whose personality has developed in a way which enables his potentially conflicting instinctive drives to find harmonious expression in the full realization of his potentialities.

In considering this definition in relation to children, it is recognized that the potentialities of the child are continually developing, and that the mental health of the adult is rooted in the sound mental health of the child.

4. Mental health is likely to occur in a family and community where the parents and other members of the family themselves are healthy and living harmoniously. For then they are better able to nurture the child in such a way as to build a robust personality.

5. Factors which influence physical health may directly or indirectly affect mental health. These factors include genetic constitution, factors affecting embryonic development, premature onset of labour and hazards of birth or of the post-natal period. In many instances, by the application of present medical knowledge, these conditions can be prevented or minimized.

6. The building up of a robust personality is assisted by an understanding of the stages in the growth and development of the child and of the complexities of interpersonal relationships.

7. Children's potentialities will develop more fully when their individual differences in physique, intelligence and temperament at each stage of their development are understood and taken into consideration by the adults charged with their care and training.

8. The best development of the child is made easier if we deal with him as an individual, for it is only from the child himself that we can learn, by listening to and watching him, what his special personal needs are. Our comprehension of the child's individual needs is helped if we remember that he behaves meaningfully to himself within the limits of his maturity and experience and that human behaviour is affected by the intellect and emotions and also by continuous mental processes, of which the conscious mind may be unaware. All and any of the child's experiences may affect his later behaviour, even if the experiences are not consciously remembered.

9. Emotional security of the kind that derives from intimate relationship with loving parents or parent-substitutes is one of the basic needs of children. Serious character defects and unhealthy ways of reacting to stress in adults can be traced back to excessive emotional insecurity in childhood.

10. In the course of the child's development conflicts are inevitable. These are often associated with desires for dependence or independence. These may give rise to emotions in parent and child which are disturbing to both of them. Either may temporarily feel hostility towards a person who is usually greatly loved, and this emotional experience may arouse anxiety. If the essentially normal nature of this reaction is understood by the parents, they can better tolerate their own feelings and in their turn give help to the child. The satisfactory handling of these conflicts forms the basis on which the child later handles his conflicts in other spheres.

11. It is a matter of common observation that emotional problems exist in every person, group, community and society.

12. As ill-health from malnutrition and infection becomes less with technological advance, emotional problems become more obvious. This tendency may perhaps be counteracted

in countries where urbanization and industrialization are in their earlier stages, by the application of the accumulated knowledge of mental hygiene available in other parts of the world and by avoiding the latter's mistakes; for such knowledge of mental hygiene already available should make it possible to modify untoward trends of social development.

13. There are children who are relatively handicapped from realizing their full development of personality and adapting adequately to the demands of their life in the community. It should be realized that these handicaps are not fixed states, but are capable of amelioration. By proper care and assistance such children can be greatly helped to proper development and adaptation.

14. In considering this concept there is need for appreciation of the cultural patterns of communities. This should be borne in mind through the usual phases of investigation, administration and application in the field.

15. Finality in knowledge of mental health is not reached yet, and there is need of research and constant reassessment of our knowledge.

Planning to Meet the Psycho-Social Needs of Children.

Group meetings and a plenary session were devoted to the theme of planning to meet the psycho-social needs of children. The following conclusions were reached.

General Principles.

1. For its practical application the needs for mental health should be interpreted in terms of the everyday living of the people, and each worker in the field of health, education and welfare needs to be able to interpret these principles according to the needs of the environment.

2. If optimal conditions for mental health are to be obtained in the community, they must come largely through all professional channels. To this end it is necessary to ensure, as far as possible, sound personality development in those professional workers engaged in the field of human relationships.

3. The needs of the community with respect to mental hygiene should be met as they arise; every effort should be made to avoid arousing anxiety by stimulating action which the community is not seeking.

4. Unwise publicity, which suggests evils that do not exist, thereby creating anxieties, or cures that do not exist, thereby raising false hopes, is most undesirable.

Programmes for Maternal and Child Health.

1. A sound programme of mental hygiene should begin with adequate pre-natal care, followed by sound natal and post-natal supervision. Adequate pre-natal care implies: (a) Good obstetric practice based on sound training both of doctors and nurses; this will minimize toxæmia of pregnancy and prematurity. (b) The guidance of the mother throughout pregnancy to a full understanding of the development of the fetus and her own emotional reactions to her family situation and to her participation in labour; this knowledge will help to minimize physical and psychological damage to the mother and child and should reduce the incidence of cerebral trauma to the infant.

2. In post-natal supervision stress should be laid on the need for the establishment of breast feeding with the avoidance of rigid programmes and for the necessity to reexamine the mother some weeks after the birth of her infant.

3. It was agreed that the teaching of the personnel engaged in the care of the nil to six years age group was of basic importance. The public health nurse (the health visitor, the infant welfare nurse) has the most direct contact with the home when children are this age, therefore adequate training in the field of mental hygiene is necessary. This also implies the inclusion of mental health principles in general nursing training. The criteria of selection of public health nurses (health visitors, infant welfare nurses) should be reviewed to make sure that only the most suitable are employed. Much damage to the mental health of mothers can be done by unsuitable personnel.

Incorporation of Principles of Mental Health in Basic Training of Nurses.

1. In order that a nurse's basic training may better prepare her for modern needs the following are desirable: (a) A broader psychological approach to the teaching of all subjects on the curriculum, including the help needed for the trainee nurse to understand her own feelings and reactions.

(b) The integration of aspects of health as well as sickness into the teaching.

2. In training programmes for obstetric nurses more recognition needs to be given to the maternity patient as a mother and to the baby's emotional needs, and a broader consideration of breast-feeding problems with less emphasis on rigid routine.

3. In the training programme of nurses in pediatric hospitals and wards considerable emphasis should be given to the characteristics of the growth and development of children, with explanations of "normal" or expected behaviour under a variety of conditions, including hospitalization.

4. In pediatric nursing the child should be considered as a whole person and due emphasis placed on his individual needs.

Hospitalization of Children.

1. The problem of hospitalization of children was approached in two sections: (a) To what extent can children be kept out of hospital? (b) When they have to be admitted to hospital, what can be done to minimize the harmful effects of separation?

2. Avoiding unnecessary hospitalization is particularly important with children under five years of age; many operations can be deferred, such as tonsillectomy and herniorrhaphy.

3. When hospitalization of the young child is unavoidable, great care should be given to the preparation of both parents and child and greater understanding shown of the child's emotional needs during the period of separation.

4. Better trained domiciliary practitioners who are able and willing to treat patients at home and better liaison between hospitals and these practitioners would reduce the need for hospitalization and allow earlier discharge of children from hospitals.

5. In the Asian-Pacific countries, owing partly to pressure on beds, there seems less unnecessary hospitalization, and we would urge that things be kept that way. It is better for the resources to be used developing home services rather than elaborate hospital development.

6. There are two types of admission, acute and elective, which pose rather different problems. Most of the points made here refer to elective admissions. Explanation is necessary at home, at the hospital during the admission phase, and on discharge. Bad explanation before admission can do much harm, and it is felt that much of this risk can be circumvented if admission techniques are improved.

7. In the admission routine mother and child need to meet someone who inspires confidence. The techniques must be elastic, allowing for variations according to circumstances. This requires education of the personnel. "It might be done as you would approach a child with its mother coming to stay in your own home."

8. Whether a child for operation should have twenty-four hours in hospital first to get used to the place or come in on the same day was discussed, without reaching a definite answer.

9. The child's introduction to the ward is considered the most important time of all. What happens to the child in the ward during its waking hours? How often do nurses know the child's familiar words for toilet actions or even his own familiar name? Surely these should be added to the admission questions.

10. Ward activity, cleaners, ambulatory children all help to interest the child, but there is the danger of the quiet ones, and some conscious effort is necessary both by staff and, ideally, by special staff for the purpose. A broad generalization is that four-year-olds can be occupied and interested by materials, but two-year-olds need people.

11. In countries where mothers are habitually admitted with the child, there is a tendency for nurses to become mere distributors of drugs.

12. How are we to recognize the children who need the mother in hospital? This can be learnt by observation, but in teaching the principles we must convince nurses that such a need is no reflection on their care. What about other children in the ward? It was generally thought that they would not be upset if they knew that their own mother would come later.

13. Who should make the decision as to visiting? "Discretion of the sister" does not work. The decision must be made by the pediatrician in conjunction with the sister.

14. A set time for visiting each day tends to be difficult for hospitals. Reasonable and convenient staggering is preferable.

Professional Training of Teachers to Equip Them Better to Contribute to Sound Mental Health Programmes.

1. In the past, in general, too much emphasis has been placed on the acquisition of professional techniques for the teaching of specific skills, with too little provision for the development of the personality of the teacher or for understanding the needs of the developing child.

2. Since one of the principles of mental health is that a child should integrate all his experiences, there should be the closest cooperation between home and school at all stages of a child's life.

3. School teachers, as a well-informed group in the community, should help to interpret the needs of children to the community.

Contributions of Psychologists to a Mental Health Programme.

1. The best contribution of the psychologist is in a multidisciplinary team.

2. The psychologists can render service, in this way, in the following areas: (i) Education: (a) teacher training, basic and in-service; (b) social and vocational guidance; (c) remedial services, in respect of specific educability; (d) adult education. (ii) Community welfare service: (a) maternal, infant and child welfare (including training of personnel); (b) hospital services; (c) family guidance (including child and marriage guidance); (d) institutions for children (for example, orphanages, homes for delinquents and handicapped children); (e) courts (including probation); (f) recreation services (for example, clubs, playgrounds, holiday camps). (iii) Industry: (a) employment services; (b) personnel relations; (c) accident prevention.

Place of Social Workers in a Mental Health Programme.

1. An understanding of the principles of mental health enunciated by the seminar is basic in the training of social workers.

2. Social work educators should be aware of this, and there is now a trend to include these principles in all schools of social work.

3. Although social workers have long been aware that every human is a distinct personality and that this fact has been demonstrated scientifically, they also need to understand specifically the principles of dynamic psychology.

4. It is unfortunate that, in the past, the principles of mental health have frequently been ignored when policies for child care were formulated.

5. Social work educators have learnt that the incorporation of principles of mental health in training courses for social workers is frequently fraught with difficulty because of anxieties aroused thereby in the students themselves. Practical experience, under supervision, of the application of these principles is necessary to allay anxiety aroused, and we should apply the principles only when the student is ready to receive them and to experience the validity of the principles.

6. It is important that this knowledge should permeate the administration of all agencies dealing with the care of young children, and it is the responsibility of social workers to interpret the principles to administrators and legislators.

7. The concept of foster-family care instead of institutional care of dependent children should be encouraged, and where substitute parental care of children under the age of six years is necessary, every effort should be made to place them with foster parents. This is more economical, and has better results than institutional care.

8. It is a healthy principle wherever possible to afford the mother of destitute children such financial and other assistance as will enable her to keep her children in her own care. High priority should be given in all countries to programmes which will allow this to be done.

9. Social workers make a major contribution to mental health of children by efforts to alleviate personal, social and economic stresses in the home.

10. All families, irrespective of economic need, should have access to case-work assistance when needed. In this connexion it is important to reach the social problems of parents coming into contact with infant welfare centres, pre-school centres, school and other social agencies.

11. In order to advance the treatment of the child as a whole, the coordination of all community resources in dealing with social problems of all kinds is regarded as fundamental. Effective coordination depends on a proper appreciation of the respective roles of each discipline, and it is the responsibility of each discipline to adapt skills and techniques to the needs of the organization.

12. The prevention of social problems presents a constant challenge to social workers, and the preventive field of social work cannot be too strongly stressed. Prevention saves costs in both human suffering and economic provision, and social workers have a responsibility to stimulate this attitude.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

SMALLPOX ON THE "PRINCE REGENT".¹

"Prince Regent",
April, 1833.

To the Honble. Alexr. Mcleay,
Colonial Secretary.

Sir,

I have the honour of communicating to you for the information of His Excellency—the arrival of the Merchant Ship "Prince Regent" in Sydney Harbour. She left London on the 7th October, 1832, and as early as the 23rd of the same month the smallpox made its appearance on board and six children have been severely attacked—the last on the 16th of December. Of these only one died and the others have at this time lost all marks of the disease.

I made an attempt to facilitate the progress of the Disease by Inoculation, but the mother of one child only could be prevailed upon to submit to it. The whole of the children were passengers in the Fore Steerage. Care has been taken to supply water from time to time to wash up the foul linen and the berths have been frequently sprinkled with chloride of lime. In addition to the death by smallpox two others have occurred—one an old woman, Mary Shearman, who had been ill for some time and died on the 3rd of January—the other a child of ten months, John Jammers, had been brought up by hand and was very weakly when brought on board—he died on 20th January. His death so affected his mother that premature labour was induced and she was delivered on the 27th January of a seven months child which lived a few hours only. I have thought it proper to forward this statement to your Honour—being aware of the dread of smallpox which is entertained in the colony—but from the length of time which has elapsed since the last case of seizure I do not conceive there is any cause to apprehend the spread of the contagion.

I am, Sir, your obt. servt.,

J. NIND,
Surgeon.

Correspondence.

SOME ASPECTS OF ANAESTHESIA IN ABDOMINAL SURGERY.

SIR: Dr. McCulloch stated (M. J. AUSTRALIA, November 21, 1953) that local anaesthesia in abdominal surgery is "extremely valuable for a very ill patient, but it is almost impossible to permit efficient abdominal exploration when the diagnosis is in doubt". I wish not only to express my agreement with this statement, but also to stress it by a composite example illustrating conditions which are not uncommon in acute abdominal surgery and in which the use of local anaesthesia is life-saving, and in which it can be used even by those who have had little training or experience in local anaesthesia.

The example is a patient with acute intestinal obstruction, distended abdomen, beginning circulatory failure and,

¹ From the original in the Mitchell Library, Sydney.

perhaps, copious vomiting of faeculent fluid, due to an obstructed external hernia, or perhaps a carcinoma of the sigmoid. Perhaps the services of a highly skilled anaesthetist are unobtainable; but, even if he is at hand, he knows that during induction vomiting may occur, or, even more dangerous, under relaxants, quiet spill-over of fluid without vomiting, and that the respiratory passages may be flooded even while he is inserting his laryngoscope. In such cases, the hernia should be dealt with, or caecostomy performed, under local anaesthesia. If the surgeon doing a caecostomy in such a case suspects that the sigmoid is obstructed by volvulus rather than carcinoma, he should make a small muscle-splitting incision in the left iliac region under local anaesthesia and inspect the sigmoid before doing the caecostomy.

235 Macquarie Street,
Sydney,
December 9, 1953.

Yours, etc.,
V. J. KINSELLA.

CORNEAL ULCER.

SIR: In reply to Dr. F. W. Simpson's letter (M. J. AUSTRALIA, December 12, 1953) I would like to thank him for his interest in my article and for his compliment in referring to it as an essay. Despite the compliment, however, it was not published as an essay but as one of the "Special Articles for the Clinician", contributed by request of the Editor.

The point is that the article was not published for the information of my ophthalmic colleagues, many of whom know more about the subject than I do myself and none of whom would be likely to miss, in a case of corneal ulceration, the presence of a glaucomatous state. The article was published for the information of the general clinicians, who must often see and give immediate treatment to cases of traumatic corneal ulceration. The object, I presume, of these special articles by practitioners of a particular specialty is to try and help others not trained in that particular subject.

I agree with Dr. Simpson that cases of corneal ulceration, combined with a glaucomatous state, will, on the law of averages, occur. In such cases the instillation of atropine will result in the danger of blindness in that eye. If, however, because of the fear of glaucoma, general clinicians do not instil atropine in their cases of traumatic corneal ulceration, for the one case they may save from glaucoma, they will lose or damage the sight of hundreds of others.

To take an analogy from general practice, doctors are confronted with many cases of acute and severe infection. There is no time to take tests for allergy, so antibiotics or sulphonamides are administered. Over the years, they will lose an occasional patient; the others will owe their lives to their doctors' prompt and appropriate treatment.

Yours, etc.,
ARTHUR D'OMBRAY,
Fellow in Ophthalmology of the
Royal Australasian College of
Surgeons.

135 Macquarie Street,
Sydney,
December 17, 1953.

DOCTORS AND COMMUNITY REQUIREMENTS.

SIR: At the conferring of degrees ceremony on December 11 at the University at St. Lucia, the Chancellor, Dr. O. S. Hirschfeld, is reported to have said (*Courier Mail*, December 12, 1953) that "there was an enormous field open to young men and women graduating in medicine today and that it would be many years before the medical profession was saturated with doctors".

In 1948 I was asked to write an article for the Press on the shortage of doctors and the needs of the future. In my opinion the answer could be found by a consideration of the following factors: (i) the number considered necessary to provide a service of requisite standard and extent, (ii) the number that we could afford to find employment for, (iii) the number of efficient practitioners that could be trained by the University of Queensland Medical School, (iv) the number that come to and go from other States, (v) the number that come to and go from abroad.

In THE MEDICAL JOURNAL OF AUSTRALIA of October 17, 1953, Sir Hugh Poate wrote that the possibility of overcrowding of the medical profession (in Queensland) in the near future was a likely happening.

Compared with the great influx following the last war we have the following additional factors to consider: (i) Queensland now has its own medical school. (ii) The large number of Commonwealth Scholarships. (iii) The award every year by the State Government of five fellowships, the winners of which have to serve the State wherever required for seven years after graduation. (iv) The fact that hospitals throughout Queensland are free to those who care to use them, so that to all intents and purposes private practice is non-existent in many places. (v) The profound effect this has on country practice, so that there is no encouragement for men to commence practice there. (vi) This applies also to larger towns to a certain extent, and another factor here is the very large amount of money it takes to set up in private practice. (vii) The fact that owing to the National Health Insurance plan in England, many men are coming from England and settling here. (viii) The large number of foreign practitioners who are here and are clamouring for registration may be admitted to practice in the various States, as has been the case in Western Australia. (ix) The large reduction in numbers of the Federal Government's immigration programme.

The question is too large to be settled offhand by ex-cathedra statements, and in the interests of the State and the parents of intending medical students every effort should be made to obtain the correct information as to the position.

Dr. Edward J. McCormick (*The Journal of the American Medical Association*, June 6, 1953), writing on the supply of physicians, states: "Those who have carefully studied complaints of physician shortages have come to the conclusion that shortages are not caused by a nation-wide lack of doctors, but primarily by faulty distribution due to professional factors related to their practice. . . . They tend to settle in metropolitan areas where up-to-date facilities are readily available."

Has not the time come when this subject should be taken up by the State Government, who could follow the advice given by the Royal Commission on Health in 1926, and set up a State Health Council to examine this and other questions of importance to the community.

Yours, etc.,
E. S. MEYERS,
A./Professor of Social and Tropical
Medicine.
The University of Queensland Medical School,
Brisbane,
December 14, 1953.

REGISTRATION OF MEDICAL PRACTITIONERS IN NEW SOUTH WALES.

SIR: I write in connexion with a matter of general interest to the medical profession.

The *Medical Practitioners Act* was recently amended to provide that all doctors who desire to continue to practise in New South Wales shall pay an annual roll fee of £1 1s. (plus exchange, if paid by cheque) for the retention of their names on the present Register. This is a very important matter, as failure to pay the fee by the prescribed date in each year will involve automatic deregistration. Provision has also been made that at the time the fee is paid, an address for insertion in the Register shall be given. While not required by law to do so, every doctor whose name appears on future Registers will be reminded by the Board to pay the fee by June 30 in each year. It is absolutely essential therefore that all changes of address be notified to me, so that this reminder may be sent to a current practising address.

The roll fee for 1954 is now due to be paid by June 30 next, but it will assist me considerably if all medical practitioners were to pay the fee immediately, as there are 5700 names on the Register, and a completely new Register will need to be compiled. The essential information required to be forwarded with the fee is: name in full (block letters), address (practising address for preference), qualifications and signature.

Yours, etc.,
P. E. COSGRAVE,
Secretary, Medical Board of
New South Wales.
52 Bridge Street,
Sydney,
December 17, 1953.

Post-Graduate Work.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE.

PROGRAMME FOR FEBRUARY, 1954.

Gynaecology and Obstetrics Refresher Course.

A gynaecology and obstetrics refresher course for recent graduates will be conducted at the Women's Hospital, Melbourne, from February 1 to 12. This course is intended to fulfil the requirements of resident medical officers about to go into private practice, and a detailed programme of the lecture-demonstrations is available from the Post-Graduate Committee. The tuition fee, £10 10s., is payable to the committee.

Pædiatrics Refresher Course.

A pædiatrics refresher course for recent graduates will be conducted at the Children's Hospital, Carlton, from February 15 to 20. The week is to be divided into 22 sessions of approximately one and a half hours' duration, of which eleven will deal with medical subjects, four with surgical subjects and two with orthopaedic subjects. The remaining five sessions will not be specifically allotted beforehand, but it is intended that they should be used for demonstrating acute conditions of general interest in patients admitted to the hospital during the week. In all sessions the emphasis is to be on clinical material. A detailed programme is available from the Post-Graduate Committee. The tuition fee is £5 5s., and enrolments should be made to the committee by February 5.

Country Courses.

Flinders Naval Depot.

At 2.30 p.m. on Wednesday, February 10, at Flinders Naval Depot, Dr. K. Newman Morris will lecture on "The Scope of Thoracic Surgery".

Ballarat.

At 8 p.m. on Thursday, February 25, at Craig's Hotel, Ballarat, Dr. J. B. Turner will lecture on "Diagnosis and Treatment of Diseases of the Anus and Rectum".

OTHER COURSES.

Courses for Part I of Higher Qualifications.

Courses suitable for candidates for Part I of higher qualifications will commence at the University of Melbourne on March 1 and continue till July, 1954. They will be as follows: (a) Anatomy for M.S., D.G.O., D.O., D.L.O., D.P.M., D.D.R., D.T.R., D.A., Primary F.R.A.C.S. and Part I of M.C.R.A., at 2 p.m. on Mondays and Wednesdays, commencing March 1. (b) Physiology for M.D., M.S., D.G.O., D.O., D.L.O., D.P.M., D.D.R., D.A. and Primary F.R.A.C.S., at 3.45 p.m. on Mondays and Wednesdays, commencing March 1. (c) Physics for D.D.R., D.T.R. and M.C.R.A., at 4 p.m. on Thursdays, from March 4 till June. (d) Pathology for M.D., M.S. and Primary F.R.A.C.S., and as a basic course for Part II of the diplomas and for M.C.R.A., at 1.45 p.m. on Mondays and Wednesdays, commencing March 8.

Enrolments should be made by February 15. The fee is £15 15s. per subject, except in the case of the D.O. course, when it is £17 17s. for physiology and £17 17s. for anatomy. The fee for the Part I D.D.R. course is £31 10s.

Course in Medicine for M.D. Part II and M.R.A.C.P.

The honorary medical staff of the Alfred Hospital will conduct a course in medicine suitable for candidates for senior medical qualifications. This will be under the direction of the Dean of the Alfred Hospital Clinical School. It will be held in June and July, 1954, for eight weeks, involving five half-days a week, and will comprise lectures, ward rounds and demonstrations. Inquiries concerning this course should be addressed to the Melbourne Permanent Post-Graduate Committee, from whom a syllabus of the course will be available. Enrolments, together with the fee of £31 10s., should be sent to the committee by April 30, 1954.

Course in Surgery for M.S. Part II and Final F.R.A.C.S.

The honorary staff of the Royal Melbourne Hospital will conduct a course in surgery suitable for candidates for

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED DECEMBER 12, 1953.¹

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	1(1)	3(1)							4
Amoebiasis	16								16
Ancylostomiasis									
Anthrax									
Bilharziasis			2(1)						2
Brucellosis									
Cholera		1(1)							1
Chorea (St. Vitus)									
Dengue									
Diarrhoea (Infantile)	6(4)	1	1(1)						8
Diphtheria	5(2)	7(6)	5(5)		6(4)				23
Dysentery (Bacillary)					1(1)				1
Encephalitis									
Filariasis									
Homologous Serum Jaundice									
Hydatid									
Infective Hepatitis		8(6)			5(1)				13
Lead Poisoning									
Leprosy					5		1		6
Leprosiopros									
Malaria									
Meningococcal Infection	3	1(1)		1					5
Ophthalmia									
Ornithosis									
Paratyphoid									
Plague									
Poliomyelitis	8(5)	3(2)	1(1)	1	1(1)				14
Puerperal Fever			1(1)					1	2
Rocky Mountain Spotted Fever					35(28)				44
Salmonella Infection									
Scarlet Fever	9(8)	21(14)	11(11)	6(3)	1(1)	1		1	50
Smallpox									
Tetanus					2(2)				2
Trachoma									
Trichinosis									
Tuberculosis	49(40)	21(18)	30(15)	5(3)	8(6)	5	1		119
Typhoid (Flea-, Mite- and Tick-borne)		1(1)			1(1)				2
Typhus (Louse-borne)									1
Yellow Fever									

¹ Figures in parentheses are those for the metropolitan area.

senior surgical qualifications, commencing March 1, 1954. This will be an eight-week course involving five half-days a week. It will be conducted by the surgical staff of the hospital and their assistants and will comprise clinical demonstrations, tutorials in surgical pathology and instruction in operative surgery. In addition, anyone entering the course will be permitted to attend the usual daily operations at the hospital. As far as possible, lists of these are posted at the Royal Australasian College of Surgeons the evening before. Inquiries concerning this course should be addressed to the Melbourne Permanent Post-Graduate Committee. Enrolments, together with the fee of £31 10s., should be sent to the committee by February 15, 1954.

Enrolments.

All entries for courses should be made with the Melbourne Permanent Post-Graduate Committee, 394 Albert Street, East Melbourne (FB 2547), not later than two weeks before the commencement of the course, or by the date specified.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Course Suitable for Candidates for Primary F.R.A.C.S. Examination.

The Post-Graduate Committee in Medicine in the University of Sydney announces that it is proposed to conduct a course of lectures suitable for preparation for the Primary F.R.A.C.S. examination to be held in September, 1954. The course will extend over twenty-five weeks from March 1 to August 20 and will consist of two lectures per week, held probably at 5 p.m. This will replace the intensive course of lectures held in previous years. Details concerning fees will be announced shortly. Those interested in attending are asked to register with the Course Secretary, The Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney. Telephones: BU 5238, BW 7483.

Honours.

NEW YEAR HONOURS.

THE following New Year Honours have been conferred by Her Majesty the Queen upon Australian medical practitioners.

Dr. Harry Wyatt Wunderly has been created a Knight Bachelor.

Dr. Brian Herbert Swift has been created a Knight Bachelor.

Dr. Kate Isabel Campbell has been created a Commander of the Most Excellent Order of the British Empire.

Surgeon Commander Eustace Alwynne Rowlands, Dr. Reginald Murray Dunstone and Dr. John Thomson Gunther have been created Officers of the Most Excellent Order of the British Empire.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Radziowsky, Nickolay, registered in accordance with the provisions of Section 17 (1) (c) of the *Medical Practitioners Act*, 1938-1950, 48 Bay Road, Waverton, New South Wales.

Deaths.

THE following deaths have been announced:

LUCRAFT.—Harry Stephenson Lucraft, on December 24, 1953, at Perth, Western Australia.

COOPER.—John Giffard Brassey Cooper, on December 25, 1953, at Maffra, Victoria.

MCINTYRE.—Fergus McIntyre, on December 27, 1953, at Coff's Harbour, New South Wales.

OWEN.—Francis Leonard Owen, on January 6, 1954, at Sydney.

Diary for the Month.

JAN. 18.—Victorian Branch, B.M.A.: Finance Subcommittee.

JAN. 19.—New South Wales Branch, B.M.A.: Medical Politics Committee.

JAN. 21.—Victorian Branch, B.M.A.: Executive of Branch Council.

JAN. 26.—New South Wales Branch, B.M.A.: Organization and Science Committee.

JAN. 27.—Victorian Branch, B.M.A.: Branch Council Meeting.

JAN. 29.—Queensland Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 235 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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